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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 6, NUMBER 19
OCTOBER 1, 1973

W73-11701 -- W73-12350

U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF WATER RESOURCES RESEARCH
WATER RESOURCES SCIENTIFIC INFORMATION CENTER

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Department of the Interior



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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1A. Properties

BOUND WATER IN DISPERSE SYSTEMS (SVYAZANNAYA VODA V DISPERSNYKH SISTEMAKH).
Moscow State Univ. (USSR).

Izdatel'stvo Moskovskogo Gosudarstvennogo Universiteta, V. F. Kiselev, and V. I. Kvlividze, editors, Moscow, 1970. 168 p.

Descriptors: *Bound water, *Dispersion, *Water properties, Water structure, Molecular structure, Hydrogen bonding, Films, Ions, Ice, Cations, Cation exchange, Aqueous solutions, Clay minerals, Rocks, Crystals, Infrared radiation, Analytical techniques, Spectroscopy, Nuclear magnetic resonance, Electrochemistry, Zeta potential, Equations.
Identifiers: *Disperse systems, *Adsorbed water.

The mechanism and properties of water adsorbed on the surface of disperse systems are examined. Problems confronting geologists in the study of bound water are discussed, and investigations are made of complex heterogeneous processes in bonding materials, using infrared spectroscopy, nuclear magnetic resonance, and electrochemical methods. (Josefson-USGS)
W73-11857

DAMPING THE ENERGY OF SURFACE WAVES BY TURBULENCE (GASHENIYE ENERGII POVERKHNOSTNYKH VOLN TURBULENTNOST'YU),
Moscow State Univ. (USSR).
G. Ye. Kononkova, and K. V. Pokazeyev.
Meteorologiya i Gidrologiya, No 8, p 91-93, August 1972. 1 fig, 2 ref.

Descriptors: *Waves (Water), *Surfaces, *Energy, *Turbulence, Turbulent flow, Mixing, Wavelengths, Equations.

The interaction of wave motion on a water surface and turbulent flow in a surface layer is examined. A decrease in the energy of wave motion results from the mixing of particles having the greatest energy of orbital motion with particles having the least energy. An expression is obtained for the damping coefficient, i.e., the decrease in wave energy as a function of the turbulence spectrum. (Josefson-USGS)
W73-12057

EFFECT OF MULTIPLE SCATTERING ON RADIANT ENERGY TRANSFER IN WATERS,
Purdue Univ., Lafayette, Ind. Heat Transfer Lab.
R. Viskanta, and J. S. Toor.
Journal of Geophysical Research, Vol 78, No 18, p 3538-3551, June 20, 1973. 11 fig, 2 tab, 23 ref.

Descriptors: Solar radiation, Water temperature, Optical properties, Light penetration, Reflectance, Turbidity, Heat balance, Heat budget, Variability, Mathematical models.
Identifiers: ScatteringOptical.

The local radiative flux and the volumetric rate of absorption of solar radiation in water may be calculated on spectral and total bases. The model considers absorption, multiple scattering, internal reflection of radiation at the air-water interface, and reflection at the bottom. Numerical results are given for pure water with isotropic, Rayleigh, forward, and experimental scattering and other physical parameters on radiant energy transfer in waters. Models which ignore scattered energy can lead to serious errors in the predictions of the radiative flux and the volumetric rate of solar energy absorption. It is unrealistic to use an arbitrary mean value of the absorption or attenuation coefficient for predicting radiative transfer in waters. Knapp-USGS
W73-12080

1B. Aqueous Solutions and Suspensions

THE INFLUENCE OF SURFACES ON THE STRUCTURE OF WATER,
North American Rockwell Corp., Canoga Park, Calif.
M. Kirsch, and W. V. Johnston.
Available from the National Technical Information Service as PB-218 560, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water, Research and Development Progress Reports No 837, December 1972. 19 p, 1 tab, 1 fig. 14-30-2914.

Descriptors: *Thermodynamics, *Molecular structure, *Membranes, *Water properties, *Water structure, Physicochemical properties, *Surfaces.
Identifiers: Differential scanning calorimetry, Solute rejection.

A combination of adsorption and calorimetric measurements was made to study structuring of water at cellulose acetate surface of varying polarity. In this work cellulose acetate powders with varying degrees of acetylation were used. The results obtained support experimental evidence from diverse sources of a relation between solvent structuring at interfaces and solute rejection. (OSW)
W73-11754

DIRECT OBSERVATION OF REVERSIBLE FORMATION OF ANIONIC SIGMA COMPLEXES RELATED TO TRANSITION STATE ANALOGS FOR ADENOSINE DEAMINASE,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
C. L. Liotta, and A. Abidaud.
Journal of the American Chemical Society, Vol 94, p 7927-7928, 1972. 2 fig, 10 ref. OWRR B-049-GA (4). NSF Grant GP 14437.

Descriptors: *Water chemistry, *Chemical reactions, *Organic compounds, Nitrogen, Carbon, Oxygen, Alcohols, Enzymes.
Identifiers: Purine analogs, Tetrahedral carbon, Anionic complexes, Reversible formation.

Adenosine deaminase has been reported to catalyze the hydrolysis of nitrogen, halogen, oxygen, and sulfur leaving groups located at the 6 position of purine ribonucleosides. Evidence has been presented which indicates that the mechanism involves nucleophilic substitution of water or enzyme-bound eater on the purine nucleus proceeding via a tetrahedral intermediate. Purine analogs were prepared with tetrahedral carbon at C-6 via photochemical addition of methyl alcohol to purine ribonucleoside and have shown that these act as powerful enzyme inhibitors. The first direct observation of the reversible formation of purine analogs with tetrahedral carbon at C-6 via a nucleophilic addition mechanism, and the first observable sigma anionic complexes not stabilized by nitro groups are described. (Woodard-USGS)
W73-11852

EFFECT OF MULTIPLE SCATTERING ON RADIANT ENERGY TRANSFER IN WATERS,
Purdue Univ., Lafayette, Ind. Heat Transfer Lab.
For primary bibliographic entry see Field 01A.
W73-12080

02. WATER CYCLE

2A. General

FORMATION AND COMPUTATION OF COMPONENTS IN A RIVER REGIME (FORMIROVANIYE I RASCHETY ELEMENTOV REZHIMA REK).
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).

Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 119, Kaganer, M. S., editor, Moscow, 1972. 144p.

Descriptors: *Rivers, *Rainfall-runoff relationships, *Flood discharge, *Storm runoff, *Surface-groundwater relationships, Hydrographs, Discharge (Water), Sediment discharge, Mudflows, Avalanches, Landslides, Karst, Tributaries, Mountains, Flood forecasting, Probability, Precipitation gages, Seasonal, Mathematical studies, Equations.
Identifiers: *Ukraine, *Carpathians, Storm precipitation, Travel time, Rain-gage networks, Nomograms.

Precipitation, flood discharge, and mudflows in the Ukrainian Carpathians are discussed in this collection of 11 papers published by the Ukrainian Hydrometeorological Scientific Research Institute. A method was developed for forecasting great storm floods on mountain tributaries of the Dniester River based on precipitation, and a study was made of the influence of karst on formation of components in a hydrologic regimen. Results are presented of investigations of suspended-sediment discharge in rivers of the Ukraine and of subsurface flow in rivers in lowland regions of the Dniester basin. (See also W73-11826 thru W73-11834) (Josefson-USGS)
W73-11825

A QUANTITATIVE RELATIONSHIP BETWEEN SURFACE AND SUBSURFACE COMPONENTS IN THE TOTAL FLOOD DISCHARGE OF RIVERS IN WESTERN AND CENTRAL PODOLIA (O KOLICHESTVENNOM SOOTNOSHENII MEZHDU PODZEMNOY I POVERKHNOSTNOY SOSTAVLYAYUSHCHIMI V SUM MARNOM STOKE PAVODKOV NA PRIMERE REK ZAPADNOY I TSENTRAL'NOY PODOLII),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
N. V. Tsupko.
In: Formirovaniye i raschety elementov rezhima rek; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 119, p 131-135, Moscow, 1972. 2 fig, 4 tab, 3 ref.

Descriptors: *Surface-groundwater relationships, *Surface runoff, *Subsurface runoff, *Flood discharge, *Rivers, Floods, Rainfall-runoff relationships, Storm runoff, Karst, Hydrographs, Correlation analysis, Equations.
Identifiers: *Ukraine, Podolia.

Quantitative relations between surface and subsurface components of storm floods on rivers in western and central Podolia were investigated. Because of the influence of karst, large amounts of groundwater are present in flood discharges. An analysis is made of approximately 400 floods, observed between 1946 and 1968 and caused by rainfall of varying intensity and duration on rivers with drainage areas ranging in size from 100 to 300 sq km. A very weak relation is observed between the volume of the storm flood and the flood-producing precipitation. For western Podolia, the coefficient of correlation is 0.67 and for central Podolia, 0.47.

Parameters of the relation of subsurface runoff to total flood discharge are determined by the least squares method and solved by digital computer. (See also W73-11825) (Josefson-USGS)
W73-11834

ON THE GROUND-WATER DISCHARGE TO THE BALTIC SEA AND METHODS FOR ESTIMATING IT,
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 02F.
W73-11843

WATER-BUDGET STUDIES OF LOWER MESILLA VALLEY AND EL PASO VALLEY, EL PASO COUNTY, TEXAS.,
Geological Survey, El Paso, Tex.
W. R. Meyer, and J. D. Gordon.
Geological Survey open-file report, June 1973. 43 p, 3 fig, 13 tab, 3 ref.

Descriptors: *Water balance, *Hydrologic budget, *Texas, Rainfall, Evaporation, Recharge, Water storage, Groundwater resources, Discharge (Water), Phreatophytes, Consumptive use, Evapotranspiration.
Identifiers: Mesilla Valley (Tex), El Paso Valley (Tex).

The total inflow of water to the lower Mesilla Valley, El Paso County, Texas, in 1970 was 390,510 acre-feet. Of this amount, 41,300 acre-feet was consumptively used by crops and phreatophytes, and 4,700 acre-feet lost by evaporation. Groundwater storage increased by 320 acre-feet, and 360,860 acre-feet left the valley as surface water and groundwater outflow. Groundwater recharge was approximately 26,170 acre-feet. The total inflow to the lower Mesilla Valley in 1971 was 282,880 acre-feet, of which 41,800 acre-feet was consumptively used by crops and phreatophytes, and 4,500 acre-feet was lost by evaporation. Groundwater storage decreased by 3,970 acre-feet and 244,320 acre-feet left the valley as surface water and groundwater outflow. Groundwater recharge was approximately 33,500 acre-feet. The average yearly inflow to the El Paso Valley in 1968-71 was 301,770 acre-feet. The average consumptive use by irrigated crops and phreatophytes was 138,870 acre-feet; the average evaporation loss was 27,000 acre-feet; the average change in groundwater storage was a decrease of 3,225 acre-feet; and the average outflow from the valley was 96,640 acre-feet. Groundwater recharge averaged about 80,710 acre-feet. (Knapp-USGS)
W73-12022

SIMULATION OF HYDROLOGIC AND CHEMICAL-QUALITY VARIATIONS IN AN IRRIGATED STREAM-AQUIFER SYSTEM--A PRELIMINARY REPORT,
Geological Survey, Denver, Colo.
L. F. Konikow, and J. D. Bredehoeft.
Colorado Water Resources Circular No 17, 1973. 43 p, 24 fig, 23 ref.

Descriptors: *Hydrologic data, *Groundwater, *Rivers, *Water quality, *Colorado, Irrigation, Aquifer characteristics, Water wells, Withdrawal, Water yield, Groundwater recharge, Computer models, Hydrology, Basic data collections, Correlation analysis, Hydrologic budget, Streamflow, Semiarid climates.
Identifiers: *Arkansas River Valley (Southeast Colo).

Salinity increases in groundwater and surface water in the Arkansas River Valley of southeaster Colorado are primarily related to irrigation practices. A digital-computer model was developed to predict changes in dissolved-solids concentration in response to spatially and temporally varying stresses. The equations which describe the transient flow of groundwater and the transport and dispersion of dissolved chemical constituents were solved numerically. The model was used to simulate the flow as well as the changes in water quality for both the stream and the aquifer. A 1-year period during which detailed field measurements had been made in an 11-mile reach of the valley between La Junta and the Bent-Otero County line was used to verify and calibrate the model. Calculated water table elevations in the aquifer were within 1 foot of the observed values approximately 90% of the time, and calculated dissolved-solids concentrations were within 10% of the observed values for both the aquifer and the stream approximately 80% of the time. (Woodard-USGS)
W73-12024

SUMMARY REPORT ON THE UPPER BEAR CREEK EXPERIMENTAL PROJECT.
Tennessee Valley Authority, Knoxville. Div. of Water Control Planning.

Hydraulic Data Branch Cooperative Report, January 1973. 43 p, 7 fig, 1 tab, 1 append.

Descriptors: *Water resources development, *Streamflow, *Water quality, *Model studies, Methodology, Planning, Land use, Hydrologic data, Groundwater movement, Simulation analysis, Watershed management, Storms, Hydrographs, Forecasting.

Two mathematical models, one a continous daily-streamflow model, the other a storm-hydrograph model, are described; they were developed for use inplanning water resources. The parameters of each model are related to watershed characteristics so that they can be applied where data are available. The two models were designed to be used separately or in combination to provide information for a wide range of planning applications. Tests of the models indicate they can be used to extend short term stream gage records, to simulate water quality constituent transport, in research watershed studies, in flood studies, and in evaluating the impact upon the water resource of land use changes. The watersheds used to calibrate the models sample a limited range of available conditions; still, these techniques promise to provide the ability to simulate water quantity and quality under past, present, or proposed land use at any point such information may be needed. (Woodard-USGS)
W73-12026

WATER BALANCE OF WORLD CONTINENTS AND BALANCE ESTIMATE OF WORLD FRESHWATER RESOURCES (VODNYY BALANS MATERIKOV ZEMNOGO SHARA I BALANSOVAYA OTSENKA MIROVYKH RESURSOV PRESNYKH VOD),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
M. I. L'vovich.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 5, p 5-20, September-October 1972. 6 fig, 5 tab, 50 ref.

Descriptors: *Water balance, *Water resources, *Freshwater, *Estimating, Hydrologic cycle, Precipitation (Atmospheric), Evaporation, Runoff, Surface runoff, Subsurface runoff, Subsurface flow, Streamflow, Soil moisture, Lakes, Reservoirs, Water supply, Hydrologic data, Curves, Maps, Equations.
Identifiers: *Continents, *Global hydrology, Icecaps.

Results are presented of many years of investigation of water balance of continents and world freshwater resources. Through use of interpolation relationships to compensate for data gaps, maps are compiled for basic items in the world water balance: total runoff (including surface and subsurface componeats); total moisture; evaporation; and the coefficient of subsurface flow to streams, which reflects much of the stable component of streamflow. Revised estimates are made of water-balance items and freshwater resources for the continents and for the USSR. Per-capita freshwater supply to continents is calculated, and a table presents data on both subsurface flow to streams and lake- and reservoir-regulated runoff for each continent. (Josefson-USGS)
W73-12054

HYDROLOGY OF THE PACIFIC OCEAN (GIDROLOGIYA TIKHOGO OKEANA).
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 02L.
W73-12063

HYDROLOGIC CHANGES AFTER CLEAR-CUT LOGGING IN A SMALL OREGON COASTAL WATERSHED,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 04C.
W73-12066

APPLICATION OF THE SOURCE-AREA CONCEPT OF STORM RUNOFF TO A SMALL ARIZONA WATERSHED,
Geological Survey, Menlo Park, Calif.
F. E. Arteaga, and S. E. Rantz.
Journal of Research, U.S. Geological Survey, Vol 1, No 4, p 493-498, July-August 1973. 5 fig, 3 tab, 5 ref.

Descriptors: *Storm runoff, *Rainfall-runoff relationships, Arizona, Antecedent precipitation, Precipitation intensity, Infiltration, Unit hydrographs, Hydrograph analysis, Peak discharge.
Identifiers: Source-area (Runoff).

The source-area concept of storm runoff was demonstrated by analysis of the rainfall-runoff relation for the watershed of Queen Creek tributary in south-central Arizona. Simplifying assumptions were needed to eliminate some of the many basin variables of unknown magnitude. The percentage of watershed contributing storm runoff was related to total rainfall received on the assumption that the availability of rainfall excess from any subarea was dependent on the saturation, or near saturation, of a permeable upper layer of soil. An average unit hydrograph was used for all computed sizes of the runoff-contributing area. (Knapp-USGS)
W73-12067

UNCERTAINTIES IN ESTIMATING RUNOFF--PRODUCING RAINFALL FOR THUNDERSTORM RAINFALL-RUNOFF MODELS,
Agricultural Research Service, Tucson, Arizona. Southwest Watershed Research Center.
H. B. Osborn, W. C. Mills, and L. J. Lane.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972, p 189-202, 1972. 3 fig, 5 tab, 8 ref.

Descriptors: Hydrology, *Rainfall-runoff relationships, *Thunderstorms, *Stochastic processes, *Estimating, Watersheds (Basins), Value, Accuracy, Data collections, Air masses, *Risks, *Arizona.
Identifiers: *Walnut Gulch Watershed (Ariz) Error.

Using records from a 95-rain-gage network, a stochastic model of air-mass (regional) thunderstorm rainfall is being developed for use in a runoff prediction model for arid land watersheds. Records from the 57-square-mile USDA-ARS Walnut Gulch Experimental Watershed in southeastern Arizona indicate that thunderstorm

rainfall fits the definition of a stochastic process accurately. A runoff prediction model based on a stochastic input (thunderstorm rainfall) and a deterministic watershed response produces a stochastic output (runoff). The validity of the runoff model depends upon the accuracy and certainity of the input and watershed response models. The uncertainties in the stochastic rainfall model are examined and the effects of these uncertainties on the stochastic output are investigated, assuming that the deterministic watershed response model is without error. Sampling errors and effects of simplification are carried through the process and compared with observed variability in actual data. (See also W73-12269) (Bell-Cornell)
W73-12282

REDUCTION OF UNCERTAINTIES IN AUTOCORRELATION BY THE USE OF PHYSICAL MODELS,
Geological Survey, Washington, D.C.
M. E. Moss.
In: Proceedings (Vol I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 203-229, 1972. 7 fig, 1 tab, 15 ref.

Descriptors: Hydrology, *Streamflow, *Annual, *Groundwater, *Base flow, *Model studies, Aquifers, Precipitation, Estimating, Stochastic processes, Infiltration, Runoff, Equations, Systems analysis, *Risk.
Identifiers: *Autocorrelation coefficients, Linear relationships.

Estimates are discussed of autocorrelation coefficients for the stationary annual streamflow series. The water year can be defined as starting with any arbitrary date in the year. The various definitions yield different autocorrelation structures for the resulting annual stream-flow series. Under the assumptions of a linear aquifer and serially independent annual precipitations, each of these series can be approximated by a mixed-autoregressive-moving-average (ARMA) process. The autocorrelation coefficients of the annual streamflow series are functions of the basin parameters and the seasonality of the precipitation regime. Sample autocorrelation in the 50-year realizations of precipitation can drastically modify the apparent autocorrelation structure of the annual streamflow sequence. The effects of the 'correlated' precipitation can be avoided by making use of the ARMA estimates of autocorrelation. The uncertainties of the small sample estimates of the autocorrelation function of streamflow may thus be reduced by the use of physical properties of the basin in its definition. (See also W73-12269) (Bell-Cornell)
W73-12283

TESTS OF STATIONARITY OF HYDROLOGIC TIME SERIES,
Illinois Univ., Urbana. Dept. of Hydraulic Engineering.
L. Torelli, and V. T. Chow.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 254-272, 1972. 5 fig, 1 tab, 3 ref.

Descriptors: *Mathematical models, Hydrology, *Time series analysis, *Stochastic processes, Hydrologic data, Average, Temperature, Precipitation, Streamflow, Equations, Systems analysis.
Identifiers: *Stationary-embedded processes.

Identification is discussed of mathematical models for hydrologic time series, particularly of monthly values of the following types: Monthly average temperatures, monthly average precipitations, and monthly streamflows. In the analysis of such monthly hydrologic time series the first step is to define a general class of stochastic processes to which the time series under analysis may belong. Commonly taken into consideration is the class of weakly stationary processes. These processes are commonly used as a hydrologic model because a vast body of theoretical knowledge concerning both the probability structure of such processes (e.g., spectral analysis, Wold theorem), and their statistics (e. g., correlogram, spectral estimates, and relative distributions and properties) are available to the analyst. Based on physical considerations a more general class of stochastic processes is needed in order to provide a suitable model for the hydrologic time series. Stationarity-embedded processes are discussed in detail. The class of weakly stationary processes is a subclass of this class of stationarity-embedded processes. The data can be analyzed to determine if the series are stationary or stationarity-embedded nonstationary. None of the series in the analysis is found to be stationary, although they can be stationarized by dividing each value by the corresponding monthly standard deviation. (See also W73-12269) (Bell-Cornell)
W73-12286

VARIABILITY OF THE SOIL WATER FLOW PARAMETERS AND THEIR EFFECT ON THE COMPUTATION OF RAINFALL EXCESS AND RUNOFF,
Agricultural Research Service, University Park, Pa. Northwest Watershed Research Center.
For primary bibliographic entry see Field 02G.
W73-12291

2B. Precipitation

DESIGN CHARACTERISTICS OF STORM PRECIPITATION IN THE CARPATHIANS (RASCHETNYYE KHARAKTERISTIKI DOZHDEVYKH OSADKOV V KARPATAKH),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
P. M. Lyutik, Ye. N. Kiptenko, and V. T. Bedratenko.
In: Formirovaniye i raschety elementov rezhima rek; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 119, p 19-32, Moscow, 1972. 1 fig, 4 tab, 7 ref.

Descriptors: *Precipitation (Atmospheric), *Rainfall, *Storms, *Mountains, *Depth-area-duration analysis, River basins, Floods, Correlation analysis, Variability, Probability, Frequency curves, Equations.
Identifiers: *Carpathians, *Storm precipitation.

Precipitation data for 1891-1970 were used to determine maximum daily precipitation probability in river basins of the Carpathians. Probability curves of maximum daily precipitation and coefficients of variation and asymmetry were determined by graphical correlation. The coefficients of variation of maximum daily precipitation range from 0.27 to 0.68. Highest values (0.40-0.68) are observed in upper reaches of the Prut, Bystritsa Nadvornyanskaya, Bystritsa Solotvinskaya, Lomnitsa, Svicha, and Stryy River basins, and lowest values (0.32-0.43) are confined to rivers in Transcarpathia. The coefficient of asymmetry varies between 0.30 and 6.00. Greatest maximum daily precipitation of 1% probability (150-200 mm) occurs in the Ciscarpathians and in the central part of the northeastern Carpathians, while the smallest (80-120 mm) is observed in the Zakarpatskaya lowland. Graphs were constructed to show the relation of maximum daily precipitation to rainfall depths of 1% probability. Observed figures of maximum rainfall for various durations (5, 10, 20, 40, 60, 90, 150, 300, 720, 1,440, and 2,880 min) for all years of observation were used. The data obtained can be used to compute rainfall amounts and their corresponding average intensities for various durations at given probabilities of exceedance. (See also W73-11825) (Josefson-USGS)
W73-11827

POSSIBILITY OF USING STORAGE PRECIPITATION GAGES TO IMPROVE THE ACCURACY OF PRECIPITATION DATA IN THE UKRAINIAN CARPATHIANS (O VOZMOZHNOSTI UTOCHNENIYA KOLICHESTVA OSADKOV V UKRAINSKIKH KARPATAKH PO DANNYM SUMMARNYKH OSADKOMEROV),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
M. M. Ayzenberg, and M. L. Vol'ftsun.
In: Formirovaniye i raschety elementov rezhima rek; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 119, p 33-39, Moscow, 1972. 3 fig, 2 tab, 11 ref.

Descriptors: *Precipitation (Atmospheric), Precipitation gages, *Mountains, Orography, River basins, Gaging stations, Rainfall disposition, Areal, Mudflows, Measurement, Correlation analysis, Curves, Seasonal.
Identifiers: *Ukraine, *Carpathians, Rain-gage networks.

The relatively dense rainfall-gage network in the Carpathians, concentrated mainly in low mountain areas at the bottoms of river valleys, should be improved to yield a more accurate picture of the areal distribution of precipitation. The Tret'yakov precipitation gages, which are used for precipitation measurement, given only point-rainfall values. To measure precipitation in mountainous areas, storage gages should be used to catch and store precipitation for periods of 30 days or more. Precipitation data obtained from storage gages during the warm season of the year are comparable to the data obtained from Tret'yakov gages installed at closely spaced meteorological stations. The presence of a network of storage gages will make it possible to record the maximum amount of precipitation occurring in mountains and will provide a basis for computing correction factors for the precipitation measured at valley gage locations. (See also W73-11825) (Josefson-USGS)
W73-11828

A COMPREHENSIVE ANALYSIS OF A MAJOR STORM AND ASSOCIATED FLOODING IN ARIZONA,
Arizona Univ., Tucson. Dept. of Watershed Management.
D. B. Thorud, and P. F. Ffolliott.
Arizona Agricultural Experiment Station, Technical Bulletin 202. May 1973 30 p. 8 tab., 18 fig., 51 ref. OWRR A-999 Ariz (2)

Descriptors: *Storms, *Floods, *Thunderstorms, *Damages, *Excessive precipitation, Rainfall intensity, Peak discharge, Forecasting, Runoff, Depth-area-duration analysis, Meteorological data, Hydrologic data, Surveys, *Arizona.

The meteorological and hydrological event known as the 1970 Labor Day Storm in Arizona caused more loss of human life than any other storm in Arizona's recent history, as well as damage to property by record flooding. The meteorological analysis of this event is documented through examination of the synoptic features, total storm rainfall, rainfall intensity, and the return period. The hydrological analyses cover peak flows and recurrent intervals, upland watershed damages, relation to land management practices, and forecasts and warnings. Losses, damages, and expenditures are detailed. A generalized and integrating analysis of the characteristics associated with these recurring storms, is recommended, so that design and safety information can be disseminated in those areas of the state where storms of tropical origin seem to have the greatest impact. Despite the loss of life and natural resources, the 1970 flood did cause increased storage in surface water reservoirs,

probably increased groundwater supplies, and created through channel scour and clearing stream conditions that subsequently improved runoff and resulted in less transmission loss of the water resource. Included are recommendations for improvements in analysis of this type of phenomenon. (Paylore-Arizona)
W73-12242

WATER-STRESS PATTERNS IN HONEY MESQUITE,
Texas A and M Univ., College Station. Dept. of Range Science.
For primary bibliographic entry see Field 02I.
W73-12252

STOCHASTIC MODELS FOR PRECIPITATION,
Metropolitan State Coll., Denver, Colo. Dept. of Mathematics.
R. A. Crovelli.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 284-298, 1972. 5 fig 7 ref.

Descriptors: Hydrology, *Stochastic processes, *Precipitation, *Storms, *Markov processes, Meteorological data, Time, Costs, Pumping, Mathematical models, Systems analysis.

Stochastic models for the meteorological precipitation process are considered. Finite continuous-time Markov chain theory is used to model the precipitation process. A new theorem dealing with the limiting state probabilities of finite continuous-time Markov chains is presented. The theorem shows that the limiting state probabilites are a simple function of the transition-rate matrix. Time-to transition precipitation models for the distributions of the random variables storm duration and time between storms are discussed. Several continuous-time precipitation models are studied. The expected total amount of precipitation of the process as a function of time is obtained. Precipitation dependent systems are also analyzed and illustrated. (See also W73-12269) (Bell-Cornell)
W73-12287

UNCERTAINTIES IN POINT AND AREAL SAMPLING OF PRECIPITATION AND THEIR IMPORTANCE IN HYDROLOGIC COMPUTATIONS,
Ministry of Agriculture and Natural Resources, Nicosia (Cyprus). Dept. of Water Development.
C. A.Phanartzis, and C. C. Kisiel.
In: Proceedings, (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 341-357, 1972. 5 fig, 2 tab, 10 ref.

Descriptors: *Sampling, *Areal, *Precipitation, *Watersheds (Basins), *Hydrology, Altitude, Mountains, Seasonal, Storms, Estimating, Mathematical models, Systems analysis, *Risks, *California.
Identifiers: Point sampling, *Cyprus, *San Dimas Experimental Forest.

The uncertainty in sampling point and areal precipitation in some small mountain watersheds in the San Dimas Experimental Forest in Southern California and in a moderate sized mountain watershed in Cyprus is examined. For the Cyprus watershed the uncertainity resulting from the spatial variability and lumping of precipitation to obtain areal estimates of same is also compared for different sampling intervals (day, month, year). The effect of altitude on precipitation amounts in the San Dimas Experimental Forest is presented in the form of a precipitation-altitude relationship which was derived earlier for a small mountain watershed with very steep slopes. The transferability of this relationship was tested by applying it to storms in a small neighboring watershed; the results are presented and discussed. Errors, due to transferring, in estimating areal precipitation, are evaluated from a watershed modeling point of view. These errors may be partly attributed to the uncertainty arising from ignorance about nature concerning precipitation-altitude-gradient relationships. The danger of transferring watershed parameters even in almost identical watersheds, when the precipitation input to the model is underlain by uncertainty, is demonstrated by using actual examples from Cyprus. (See also W73-12269) (Bell-Cornell)
W73-12290

THE DESIGN OF OPTIMAL PRECIPITATION MEASURING NETWORKS FOR FLOOD FORECASTING,
Enviro-Engineers Ltd., Cincinnati, Ohio.
W. M. Grayman, and P. S. Eagleson.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 379-394, 1972. 6 fig, 7 ref.
Identifiers: *Susquehanna River.

In the design of any information gathering system, the ultimate use of this information should be considered; the design process should include the designation of relevant objectives, the accounting of all benefits and costs attributed to the objectives, and the selection of the system that maximizes some weighted combination of net benefits. This study analyzes a precipitation measuring network in terms of a single objective--maximization of net national income--and a single purpose, i.e. use of the measurements in a flood warning system. A flexible computer-based simulation model has been developed to determine the net benefits associated with a network. Model results suggest that such networks are feasible for a wide range of economic and hydrologic situations. Furthermore raingage networks result in higher net benefits than do combined radar-raingage systems for all situations tested. The feasibility of the use of economic analysis in evaluating precipitation measuring networks is demonstrated. The optimal density of raingages depends on the level of economic development in a region, the frequency and severity of floods, and the accuracy of the measuring instruments. Application of this model to an actual river basin is demonstrated through a case study of the West Branch of the Susquehanna River. (See also W73-12269) (Bell-Cornell)
W73-12292

SPACE-TIME UNCERTAINTIES IN PRECIPITATION MEASUREMENT,
Illinois State Water Survey, Urbana.
F. A. Huff, and P. T. Schickedanz.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 395-409, 1972. 3 fig, 5 tab, 10 ref.

Descriptors: *Precipitation, Measurement, *Rain gages, *Networks, *Climatic data, *Hydrology, *Illinois, Estimating, Analytical techniques, Hydrologic data, Storms, Seasonal, *Risks.
Identifiers: *Space-time, Errors.

Research results are presented, based primarily upon data from Illinois dense raingage networks used to assess space-time uncertainties in precipitation measurements under midwestern U.S. climatic conditions. Measurements for time periods ranging from one minute through total storm, monthly, and seasonal periods have been studied on networks of 10 to 600 square miles, with emphasis on needs in weather modification evaluations. Uncertainties have been evaluated for the time-period data stratified by precipitation type, synoptic storm type, and season. The cost of installing and maintaining dense networks of size appreciably greater than 600 square miles is often prohibitive, but measurements on much larger areas are frequently required to meet hydrologic, climatic and weather modification needs. Therefore, techniques have been developed to estimate measurement errors in areas of limited data coverage and in different climatic regimes by applying knowledge accumulated from the network studies. Required space density and time measurement period for specified levels of precision can be calculated for any given sampling area with the developed techniques through use of climatic data for the region of interest. (See also W73-12269) (Bell-Cornell)
W73-12293

PRECIPITATION PROBABILITIES FOR KENTUCKY,
Kentucky Agricultural Experiment Station, Lexington.
A. B. Elam, Jr., C. T. Haan, B. J. Barfield, and T. C. Bridges.
Available from NTIS Springfield, Va 22151 as COM-73-10286 Price $3.00 printed copy; $1.45 microfiche. Progress Report 202, December 1972. 56 p, 15 fig, 2 tab, 11 ref, 2 append.

Descriptors: *Precipitation (Atmospheric), *Meteorological data, *Kentucky, *Rainfall, Forecasting, Methodology, Rainfall disposition, Rainfall intensity, Probability.
Identifiers: *Precipitation probabilities (Ky).

The probabilities of receiving specified amounts of precipitation are presented for 1-, 2-, and 3-week periods at 25 locations in or near Kentucky. Information is given on the source of the data, method of analysis, and Kentucky precipitation patterns. The period of record chosen was January 1932 through June 1969. Data tables show the mean precipitation for the 1-, 2-, and 3-week periods and the probabilities of receiving a specified amount or more of precipitation for these periods. Examples of how to use tables are included. Annual precipitation in Kentucky ranges from about 50 inches to the south and to about 38 inches in the north. The larger amounts in the south reflect the lesser distance from the Gulf of Mexico, the prime source of moisture for Kentucky precipitation. The warmer months of June, July, and August present a pattern with the maximum precipitation tending to occur in the central and/or eastern portions of the state. The remaining months show little or no pattern. (Woodard-USGS)
W73-12304

2C. Snow, Ice, and Frost

ICEFIELD RANGES RESEARCH PROJECT SCIENTIFIC RESULTS, VOLUME 3.

American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal, Canada, V. C. Bushnell, and R. H. Ragle, editors, 1972. 261 p.

Descriptors: *Glaciers, *Glaciology, *Glaciohydrology, Canada, Movement, Flow, Regimen, Geomorphology, Vegetation effects, Sedimentology, Permafrost, Remote sensing.
Identifiers: Icefield ranges (Canada), St. Elias Mountains (Canada), Yukon Territory.

The studies reported in volume 3 of the Icefield Ranges Research Project fall into three general categories: (1) those related to surging-glacier research; (2) topics of general interest in the physical sciences; and (3) topics of general interest in the biological sciences. Included in the first category are studies of the Steele Glacier, which

surged in 1965-1968, and studies of the Rusty Glacier, which is believed to be in a presurge phase. Geomorphology, structures of braided streams, permafrost, frost action, supraglacial streams, moraines, hydrogeology, and remote sensing are among the specific topics discussed. (See W73-11791 thru W73-11809) (Knapp-USGS)
W73-11790

STEELE GLACIER, 1935-1968,
American Geographical Society, New York.
W. A. Wood.
In: Icefield Ranges Research Project Scientific Results, Vol 3. American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal, Canada, p 1-8, 1972. 9 fig, 8 ref.

Descriptors: *Glaciers, *Canada, *Regimen, *Flow, Mapping surveys, Aerial photography, Photography, Glaciology.
Identifiers: *Icefield Ranges (Canada), *Surging glaciers, *Steele Glacier (Canada).

Steele Glacier is about 35 km long and rarely more than 2.5 km wide. It is one of many ice streams which drain the northeastern slopes of the St. Elias Mountains in Canada. From an appraisal of 1960 photography, Steele Glacier was evaluated as being in a state of imminent surge. Movement of the ice was measured, and a daily rate of 15 m was established. By August 1968 the surge appeared to have run its course. The zone of contact between active ice of the surge and stagnant debris-covered ice of the last advance showed little change from the August 1967 stand. The chaotic texture of the surface, so dramatic in 1966, had been replaced by softened lines and angles. (See also W73-11790) (Knapp-USGS)
W73-11791

MOVEMENT OBSERVATIONS ON THE TERMINUS AREA OF THE STEELE GLACIER, JULY 1967,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
S. Thomson.
In: Icefield Ranges Research Project Scientific Results, Vol 3. American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal Canada, p 29-37, 1972. 12 fig, 1 tab, 3 ref.

Descriptors: *Glaciers, *Canada, *Regimen, *Sediment transport, *Flow, Surveys, Sediments, Glaciology, Glacial drift, Rheology, Till.
Identifiers: *Icefield Ranges (Canada), *Surging glaciers, *Steele Glacier (Canada).

An expedition on the Steele Glacier, Canada, from July 10-24, 1967, studied the effects of a surging glacier on the formation of glacial deposits and observed the means of incorporating debris into the ice mass. A part of this study consisted of measurements of the movement of the active ice mass and the reactivation of dead ice. During the first few days, rates of movement were approximately 0.4 ft/hr, but by the end of the observation period the motion had slowed to less than half this value. The portion of the dead ice being reactivated had rates of movement of the same order of magnitude. The dead ice appears to be reactivated by the generation of a series of shear planes, some of which rise from the ground surface through the entire ice mass. Suggested mechanisms for incorporation of debris into the ice mass are motion on shear planes and overriding of superglacial debris on the dead ice. (See also W73-11790) (Knapp-USGS)
W73-11792

COMPARISON OF MORAINES FORMED BY SURGING AND NORMAL GLACIERS,
Geological Survey of Canada, Calgary (Alberta).
N. W. Rutter.
In: Icefield Ranges Research Project Scientific Results, Vol 3. American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal, Canada, p 39-46, 1972. 8 fig, 2 tab, 18 ref.

Descriptors: *Glaciers, *Flow, *Montana, *Glacial drift, *Sedimentary structure, Petrofabrics, Till, Geomorphology, Stratigraphy.
Identifiers: *Bighorn Glacier (Mont), *Grizzly Glacier (Yukon), Surging glaciers.

A neoglacial moraine of Bighorn Glacier, St. Elias Mountains, probably formed by a surging glacier, and a neoglacial normal moraine of nearby Grizzly Glacier were studied. Surficial deposits and erosional features were mapped. Fabric analyses were done in till at five sites in each moraine. Samples were subjected to laboratory lithologic and texture analyses. The Bighorn (surge) moraine is a thin, discontinuous, irregular mantle, mostly till, but including ice-contact stratified material. Lateral moraines show subdued ridges marking the upper limit of glaciation. Ground moraine of the Grizzly (normal) glacier is an irregular, continuous, thick mantle, mostly till and ice-contact stratified material. Upper ice limits are marked by prominent ridges. Rocks of similar lithologies within the till are concentrated in bands parallel to glacier flow. Stones in till of the Grizzly moraine have strong preferred orientation roughly in the direction of glacier flow. In the Bighorn morain, rocks in till are weakly oriented. Where orientation is apparent, it is not necessarily in the flow direction. For the size fraction finer than 2 mm, Bighorn till is coarser than Grizzly till although the bedrock terrain is similar. These differences are useful in distinguishing moraines of normal and surging glaciers. (See also W73-11790) (Knapp-USGS)
W73-11793

SOME ASPECTS OF THE GEOMORPHOLOGY OF MELTWATER STREAMS, STEELE GLACIER TERMINUS,
Alberta Univ., Edmonton. Dept. of Geology.
A. J. Broscoe.
In: Icefield Ranges Research Project Scientific Results, Vol 3. American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal, Canada, p 47-51, 1972. 2 fig, 3 tab, 1 ref.

Descriptors: *Sediment load, *Water chemistry, *Glaciohydrology, *Geomorphology, *Suspended load, *Bed load, Sediment transport, Alluvial channels, Glacial drift, Discharge (Water), Sediment yield.
Identifiers: *Steele Glacier (Canada).

The geomorphology of the headwaters of Steele Creek, which originates at the terminus of the Steele Glacier, Yukon Territory, is described. Two channels drain from the glacier. The smaller channel to the north had a discharge in July of about 2.3 cu m/sec adjacent to the glacier, and a suspended sediment load of about 4.5 kg/sec. The bed load included boulders. At a distance of 1400 m from the front of the glacier, the channel had a discharge of 4.87 cu m/sec and a suspended load of about 9 kg/sec. The main channel had a discharge of about 49.3 cu m/sec and a sediment load of about 63 kg/sec. Bed load transport was strongly effective in the main channel. The chemical composition of the water indicates that the two forks of Steele Creek have separate sources under the glacier. Material is being eroded mainly from the channel floors rather than removed from the glacier directly. The sediment in suspension contains high percentages of sand which is very angular and consists of quartz plus small fragments of the local bedrock. (See also W73-11790) (Knapp-USGS)
W73-11794

OBSERVATIONS ON AN ALPINE MUDFLOW, STEELE CREEK,
Alberta Univ., Edmonton. Dept. of Geology.
A. J. Broscoe, and S. Thomson.
In: Icefield Ranges Research Project Scientific Results, Vol 3. American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal, Canada, p 53-60, 1972. 7 fig, 2 tab, 13 ref.

Descriptors: *Mudflows, *Glaciohydrology, *Glacial drift, *Sediment transport, Alpine, Canada, Mass wasting, Sedimentation, Erosion, Sedimentology, Till, Particle size.
Identifiers: *Steele Creek (Canada).

Alpine mudflows occurred on the ridges above Steele Creek, St. Elias Mountains, Yukon Territory, on July 11, 1967, during a rainfall of 2.19 inches in 36 hours. One flow was observed in an area of flat-topped, steep-sided morainal terraces on the lower part of the north valley wall. This mudflow emerged in pulses from a notch at the upper margin of the terrace surface, and formed fronts 6 to 8 ft high. The arcuate fronts broke either to the east or west, and the mud flowed across the fan and through erosional notches to the valley floor. A detailed map and profiles show the topography and distribution of materials. The stream deposited coarse bed load on the alluvial fan on the upper terrace, then cascaded down the notch. Undercutting of the notch caused periodic collapse of the morainal material, which formed temporary dams. Water and finer bed load were impounded and the dam was saturated but not overtopped. Saturated material emerged from the notch as viscous, rock-charged mud. Particles in the mudflow ranged in size from colloids to boulders 13 ft across. Pebbles from a mudflow sample included 70% locally derived lava and 18% granite from the moraine. Material finer than 2 microns was predominantly monmorillonite. Rain and runoff washed fine material from mudflow deposits, leaving the lag deposit similar to alluvial gravel. Botanical evidence indicates that mudflows occur at intervals of decades. The collapse of material from the sides of the steep-walled, high-gradient notch, cut into easily erodable till, controlled the pulsating nature of the observed mudflow. (See also W73-11790) (Knapp-USGS)
W73-11795

OBSERVATIONS OF THE SURGE OF STEELE GLACIER,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
A. D. Stanley.
In: Icefield Ranges Research Project Scientific Results, Vol 3. American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal, Canada, p 61-69, 1972. 4 fig, 2 tab, 22 ref.

Descriptors: *Glaciers, *Canada, *Regimen, *Flow, Mapping surveys, Aerial photography, Photography, Glaciology.
Identifiers: *Icefield Ranges (Canada), *Surging glaciers, *Steele Glacier (Canada).

For part of 1966, Steele Glacier in the Icefield Ranges, Yukon Territory, made a spectacular advance at a rate exceeding 500 m per month. The main part of the surge continued for two years, but by early 1968 the advance had slowed to less than one tenth of the maximum rate. For most of the 35-km length of the main trunk the surface was a chaotic jumble of ice blocks, spires, and pinnacles, but large structures outlined by surface moraine were preserved. Most of these structures had been displaced 8 km by August 1967, irrespective of their original location. Structures were displaced similar distances down the length of the glacier; most of the glacier moved forward as a block. The surge has not been correlated with any local earthquake activity, and there is no evidence for a short term climatic change. The movement resulted from critical dynamic conditions within the glacier, possibly facilitated by increased amounts of water along the ice-bedrock contact. (See also W73-11790) (Knapp-USGS)
W73-11796

THE ICE-DAM, POWDER-FLOW THEORY OF GLACIER SURGE,
Monsanto Co., St. Louis, Mo.
L. E. Nielsen.
In: Icefield Ranges Research Project Scientific Results, Vol 3. American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal, Canada, p 71-74, 1972. 6 fig, 8 ref.

Descriptors: *Glaciers, *Flow, *Rheology, Mudflows, Landslides, Movement, Freezing, Melt water, Glaciohydrology, Regimen.
Identifiers: *Surging glaciers, *Powder flow.

To explain surging glaciers, this theory assumes that a stagnant iceblock or dam develops in the lower regions. Ice gradually builds up above the dam while the dam itself becomes thinner by ablation. Eventually the upper end of the stagnant iceblock crumbles from the force of the ice above it, and much of the glacier is changed from a state of compression to one of tension. The breaking of the ice dam results in the glacier rapidly becoming broken into a mass of blocks or powdered ice. The apparent viscosity of the broken-up glacier is much less than that of bulk ice, so high velocities of flow are possible, and a phenomenon similar to a mudflow results. This theory explains why some glaciers repeatedly surge yet appear stagnant between surges. The broken-up appearance of surging glaciers and the delayed surging of tributaries are explained. Additional substantiating observations on several of these phenomena are presented. (See also W73-11790) (Knapp-USGS)
W73-11797

A TWO-YEAR MASS-BALANCE STUDY OF THE RUSTY GLACIER, 1968-1969,
Boston Univ., Mass. Dept. of Geology.
T. Brewer.
In: Icefield Ranges Research Project Scientific Results, Vol 3. American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal, Canada, p 75-82, 1972. 5 fig, 2 tab, 11 ref.

Descriptors: *Glaciers, Water balance, *Regimen, Flow, Snowfall, Canada, Ablation, Glaciology, Sampling.
Identifiers: *Surging glaciers, *Rusty Glacier (Canada), *Mass balance.

Rusty Glacier is a small valley glacier in Yukon Territory with a history of glacial surging. A mass-balance study was carried out on Rusty Glacier during 1968 and 1969. The 1968 mass balance was (+) 6,000 million kg of water, while the 1969 balance was (-) 1,590 million kg. This yields a two-year balance of (-) 990 million kg. Statistical examination of the data indicates that this two-year result is reliable to +44%. The distribution of snow in 1968 confirms the presence of a bedrock hump under the ice predicted from gravity measurements. The five-year mass balance (1967-1971) may be negative, and about 1,000 million kg. (See also W73-11790) (Knapp-USGS)
W73-11798

HYDROLOGICAL STUDY OF THE RUSTY GLACIER,
Vrije Universiteit, Amsterdam (Netherlands). Instituut voor Aardwetenschappen.
T. Faber.
In: Icefield Ranges Research Project Scientific Results, Vol 3. American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal, Canada, p 83-92, 1972. 6 fig, 13 tab, 6 ref.

Descriptors: *Glaciohydrology, *Glaciers, *Water balance, Water yield, Canada, Ablation, Discharge (Water), Melt water, Regimen, Glaciology.
Identifiers: *Rusty Glacier (Canada), *Surging glaciers, Mass balance.

The Rusty Glacier is probably in a presurge phase. It and two other glaciers, the Trapridge and the Backe, occupy a common basin in the St. Elias Mountains, Yukon Territory. Hydrological data from the basin as a whole and from each of the individual glaciers were gathered during the period July 9-August 15, 1968. During this period the total discharge from the basin was 6.9 million cu m. Rusty Glacier contributed 24% of this discharge; the other two glaciers together contributed 52%; and the ice-free part of the basin contributed 12%. The contribution of the Rusty Glacier to the total discharge is distinctly lower than that of the other glaciers. The low discharge from the Rusty Glacier is in accordance with the expectation that this glacier will surge. Statistical formulas are given for the relationship of discharge to temperature and to precipitation. The calcium content of both the water and its suspended sediment in the discharge near the exit of the basin is mainly due to the calcium content of the discharge from a Trapridge Glacier stream which flows across moraine containing limestone fragments. (See also W73-11790) (Knapp-USGS)
W73-11799

GRAVITY AND SHALLOW-ICE TEMPERATURE MEASUREMENTS ON THE RUSTY GLACIER,
British Columbia Univ., Vancouver. Dept. of Geophysics.
D. J. Crossley, and G. K. C. Clarke.
In: Icefield Ranges Research Project Scientific Results, Vol 3. American Geographical Society, New York, N Y, and Arctic Institute of North America, Montreal, Canada, p 93-101, 1972. 3 fig, 1 tab, 18 ref, 2 append.

Descriptors: *Glaciers, *Gravity studies, *Temperature, Surveys, Canada, Movement, Flow, Sounding.
Identifiers: *Rusty Glacier (Canada), *Surging glaciers.

The Rusty Glacier, Yukon Territory, has a history of surging but is at present quiescent. In 1968 a gravity survey indicated the glacier has a maximum depth of 88 m. Near-surface temperature measurements identify the Rusty as a subpolar glacier. Depth profiles across the glacier show no unusual bedrock features. (See also W73-11790) (Knapp-USGS)
W73-11800

THERMAL DRILLING AND ICE-TEMPERATURE MEASUREMENTS IN THE RUSTY GLACIER,
British Columbia Univ., Vancouver. Dept. of Geophysics.
D. F. Classen, and G. K. C. Clarke.
In: Icefield Ranges Research Project Scientific Results, Vol 3, American Geographical Society, New York, NY, and Arctic Institute of North America, Montreal, Canada, p 103-116, 1972. 4 fig, 5 tab, 32 ref, 2 append.

Descriptors: *Glaciers, *Geothermal studies, *Heat flow, *Temperature, Melting, Movement, Drilling, Sampling, Borehole geophysics.
Identifiers: *Rusty Glacier (Canada), *Surging glaciers.

During the summer of 1969 a thermal rilling and deep-ice temperature measurement program was carried out on the Rusty Glacier, Yukon Territory. The thermal drilling produced seven instrumented holes at six locations on the glacier, three reaching bedrock. The glacier was below the pressure-melting point throughout, and there is evidence of a disturbed thermal regime. Geothermal heat flow had an anomalous value of 4.73 microcal per sq cm sec. Bottom temperature models indicate the possibility of basal melting. (See also W73-11790) (Knapp-USGS)
W73-11801

ABUNDANCES OF ISOTOPIC SPECIES OF WATER IN THE ST. ELIAS MOUNTAINS,
Alberta Univ., Edmonton.
K. E. West, and H. R. Krouse.
In: Icefield Ranges Research Project Scientific Results, Vol 3, American Geographical Society, New York, NY, and Arctic Institute of North America, Montreal, Canada, p 117-130, 1972. 21 fig, 4 tab, 22 ref.

Descriptors: *Oxygen isotopes, *Water balance, *Glaciohydrology, Tracers, Stable isotopes, Movement, Glaciers, Canada, Snowfall.
Identifiers: *St. Elias Mountains (Canada), *Surging glaciers.

Snow and ice samples were collected from the St. Elias Mountains in the Yukon Territory during the summers of 1968 and 1969. The collection sites included Mt. Logan (elevations up to 5800 m), Divide (the accumulation area of the Hubbard and Kaskawulsh Glaciers), and Rusty Glacier (a glacier with possible surging properties). The O-18 values varied from -4.51% (SMOW) on Mt. Logan, elevation 5,860 m, to -14.8% (SMOW) at the Rusty Glacier, in rainfall at 2,460 m elevation. The O-18/O-16 data elucidated complex weather patterns caused by the St. Elias Mountains acting as an obstacle to easterly flow, as well as giving insight into the flow pattern of the Rusty Glacier. (See also W73-11790) (Knapp-USGS)
W73-11802

SNOW ACCUMULATION IN THE ICEFIELD RANGES, ST. ELIAS MOUNTAINS,
Michigan Univ., Ann Arbor. Dept. of Geography.
M. G. Marcus, and R. H. Ragle.
In: Icefield Ranges Research Project Scientific Results, Vol 3, American Geographical Society, New York, NY, and Arctic Institute of North America, Montreal, Canada, p 131-142, 1972. 7 fig, 2 tab, 46 ref, 2 append.

Descriptors: *Snowfall, *Snowpacks, *Water balance, Water yield, Canada, Alpine, Snow surveys, Climatology.
Identifiers: *St. Elias Mountains (Canada), *Icefield Ranges (Canada).

Snowpack characteristics in the St. Elias Mountains were examined as part of the Icefield Ranges Project for 1961-1965, emphasizing particularly the 1964-1965 glacier balance year, together with reconstructions for 1953-1961. Analysis was carried out along a hydrological traverse on the Kaskawulsh, Hubbard, and Seaward-Malaspina Glaciers, and at a single location through a period of time. The data obtained are summarized in graphs and tables. The relationships between precipitation, elevation, and topography, and effects of continentality and exposure are considered. In no case are the relationships clearly defined, but it is evident that elevation is a critical factor in the maintenance of continental slope glaciers and spring runoff. Fluctuations in net accumulation were determined and evaluated; a stable period is indicated for the late 1950's, followed by an increase of 200 to 300 mm in the early 1960's and a minimum in 1964-1965 and 1965-1966 of winter nourishment and mass balance. (See also W73-11790) (Knapp-USGS)
W73-11803

THE EFFECTS OF A SUBARCTIC GLACIER ON RADIO-WAVE PROPAGATION IN SUMMER,
University of Electro-Communications, Tokyo (Japan).
T. Yoshino.
In: Icefield Ranges Research Project Scientific Results, Vol 3, American Geographical Society, New York, NY, and Arctic Institute of North America, Montreal, Canada, p 143-152, 1972. 24 fig, 6 ref.

Descriptors: *Glaciers, *Remote sensing, *Radio waves, Electrical studies, Air temperature, Snow, Ice, Glaciology, Radar, Instrumentation.

The attenuation of radio waves reflected on a glacier surface and propagation loss through ice were measured. Reflection coefficients were determined over a range of air temperatures. In summer, the air temperature a short distance above the snow and ice surface of a Subarctic glacier rises above 0 deg C during a warm day. The reflection coefficient during such a warm day exceeds 0.4, and drops below 0.1 during a cold night; the average value of the coefficient is 0.35. These reflection coefficients at MF and HF ranges are less than those of any other ground surface except the Antarctic and Greenland ice sheets. The dielectric constant of glacier ice for air temperatures was measured from -15 deg C to 0 deg C. A simple method of calculating dielectric constants for a known temperature is given. (See also W73-11790) (Knapp-USGS)
W73-11804

SUPRAGLACIAL STREAMS OF THE KASKAWULSH GLACIER,
Michigan Univ., Ann Arbor. Dept. of Geography.
K. J. Ewing.
In: Icefield Ranges Research Project Scientific Results, Vol 3, American Geographical Society, New York, NY, and Arctic Institute of North America, Montreal, Canada, p 153-162, 1972. 10 fig, 9 ref.

Descriptors: *Glaciohydrology, *Glaciers, *Melt water, *Channel morphology, Streamflow, Temperature, Weather, Melting, Ablation, Geomorphology.
Identifiers: *Supraglacial streams, *Kaskawulsh Glacier (Canada).

Two general categories of supraglacier streams were identified during the summers of 1965 and 1966 on the Kaskawulsh Glacier, Yukon Territory: (1) annual streams having shallow channels, and (2) perennial streams having deeper channels which are reused from year to year. Perennial channels had depths of one meter or more; they were generally parallel to the glacier flow, and were often regularly spaced across the glacier. The dynamic factors, climate and glacier movement, are particularly important to the formation of supraglacial streams, in addition to the static factors of relief, structure, and gradient. Daily maximums and minimums in stream discharge lagged behind daily maximum and minimum temperatures. This lag increased downstream. Glacier movement changes stream gradient, the realigning of stream patterns, and the elongation of stream pattern. Ice type, presence of crevasses, type of relief, and the presence of surface debris all contributed to the nature and volume of the streams. (See also W73-11790) (Knapp-USGS)
W73-11805

PATTERNS OF SURFACE TEMPERATURE IN THE ALPINE/PERIGLACIAL ENVIRONMENT AS DETERMINED BY RADIOMETRIC MEASUREMENTS,
State Univ. Coll., Geneseo, N.Y. Dept. of Geography.
R. Lougeay.
In: Icefield Ranges Research Project Scientific Results, Vol 3, American Geographical Society, New York, NY, and Arctic Institute of North America, Montreal, Canada, p 163-176, 1972. 12 fig, 6 tab, 10 ref.

Descriptors: *Remote sensing, *Glaciers, *Infrared radiation, *Temperature, Solar radiation, Ice, Snow, Soil, Talus, Glacial drift, Photometry.
Identifiers: Radiometry, St. Elias Mountains (Canada).

Observations were conducted in the St. Elias Mountains, Yukon Territory, to determine the applicability of thermal remote sensing in the alpine and periglacial environments. Techniques of obtaining ground observations were tested by which the usefulness of infrared scanning can be determined without the expease of airborne sensing on a trial and error basis. An attempt was also made to determine the effects of changing meteorologic conditions on both actual and radiometric temperatures of several terrain surfaces. These surfaces include various types of ice-cored moraine, glacial ice, and morainic outwash at the terminal margins of a large valley glacier. Temperatures obtained radiometrically were directly linked to insolation, which is in turn a function of cloud cover and atmospheric transmissivity. When comparing radiometric temperatures with the various components of the energy balance over an environmental surface, trends in radiometric temperature closely mirrored trends of net radiation at the surface, as expected. The techniques appear useful in predicting the best time for thermal remote sensing overflight, and in indicating the intensity of ground observations needed at that time. (See also W73-11790) (Knapp-USGS)
W73-11806

UP-HEAVED BLOCKS: A CURIOUS FEATURE OF INSTABILITY IN THE TUNDRA,
Portland State Univ., Oreg. Dept. of Geography.
L. W. Price.
In: Icefield Ranges Research Project Scientific Results, Vol 3, American Geographical Society, New York, NY, and Arctic Institute of North America, Montreal, Canada, p 177-181, 1972. 2 fig, 15 ref.

Descriptors: *Tundra, *Solifluction, *Geomorphology, *Frost heaving, *Frost action, Arctic, Canada, Heaving, Ice, Frozen soils, Permafrost.
Identifiers: Ruby Range (Canada), Frost-heaved blocks.

Up-heaved blocks occurring in unconsolidated material on well-vegetated slopes in the Ruby Range, Yukon Territory, were investigated. These are very similar in appearance to the frost-thrust blocks which normally occur on level, poorly vegetated, bedrock areas. The up-heaved blocks in the study area are one to three feet high and show evidence of recent activity. Freshly overturned turf around the bases of some of the blocks suggest that they may have been thrust above the surface by considerable force. Annual movement is only one to two inches. Origin of these features is a result of several processes. Diurnal freeze and thaw is important for two or three weeks in the spring when a narrowly thawed zone surrounding the block allows the development of frost pressure within a semi-closed system. The annual freeze in the fall contributes about one-fourth inch to the upheaval of the blocks, and solifluction is important during the summer. The size and shape of blocks, as well as local site conditions, govern the occurrence of these features which are striking evidence of the instability that characterizes the tundra. (See also W73-11790) (Knapp-USGS)
W73-11807

VEGETATION, MICROTOPOGRAPHY, AND DEPTH OF ACTIVE LAYER ON DIFFERENT EXPOSURES IN SUBARCTIC ALPINE TUNDRA,
Portland State Uaiv., Oreg. Dept. of Geography.
For primary bibliographic entry see Field 02J.
W73-11809

FORECASTING RUNOFF FROM UNIVERSAL SURFACE GAGE SNOWMELT MEASUREMENTS,
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
L. M. Cox, and J. F. Zuzel.
Journal of Soil and Water Conservation, Vol 28, No 3, p 131-134, May-June 1973. 6 fig, 1 tab, 5 ref.

Descriptors: *Snowmelt, *Water yield, *Runoff forecasting, Statistical methods, Correlation analysis, Melting, Thawing, Snow surveys, Antecedent precipitation, Gages, Snowpacks.

Many daily rates of snowmelt runoff depend strongly on antecedent snowmelt and runoff. The method of least squares, coupled with an accumulation procedure, produces high correlations between accumulated runoff and accumulated snowmelt. It is possible, therefore, to forecast both mean daily flows and daily volume for a basin during a snowmelt event. This method also appears useful for extended runoff forecasts based on the amount of snow remaining at a snow-course sampling site. These extended forecasts can be made with greater accuracy than 1-day forecasts. The universal gage is especially suited for making short-term forecasts because it gives information on both daily snowmelt and water equivalent values. This information can be used for making daily predictions as well as extended forecasts. Both the daily snowmelt and water equivalent measurements are easily adapted to telemetering systems to obtain information from remote sites. (Knapp-USGS)
W73-11853

THERMAL REGIME OF FREEZING BODIES OF WATER (TERMIKA ZAMERZAYUSHCHIKH VODOYEMOV),
A. A. Pivovarov.
Izdatel'stvo Moskovskogo Gosudarstvennogo Universiteta, Moscow, 1972. 140 p.

Descriptors: *Temperature, *Heat balance, *Heat flow, *Freezing, *Bodies of water, Rivers, Lakes, Reservoirs, Ice, Ice cover, Crystallization, Cooling, Heating, Melting, Radiation, Turbulence, Mixing, Depth, Seasonal, Equations.
Identifiers: Heat exchange.

A physicomathematical description is given of temperature changes and ice conditions in rivers, lakes, and reservoirs. Items in the heat balance of water bodies are examined together with summer warming and autumnal cooling, temperature regime of water under ice, growth and decay of ice cover, and dynamics of ice processes in open water. Theoretical methods are reduced to working formulas suitable for practical use and compared with field data. (Josefson-USGS)
W73-11858

INVESTIGATION OF EFFECT OF SOIL FREEZING DEPTH AND OTHER FACTORS ON SNOWMELT RUNOFF ON RIVERS IN STEPPE AND FOREST-STEPPE ZONES (ISSLEDOVANIYE VLIYANIYA GLUBINY PROMERZANIYA POCHVY I DRUGIKH FAKTOROV NA TALYY STOK REK STEPNOY I LESOSTEPNOY ZON),
Gidrometeorologicheskii Nauchno-Issledovatelskii Tsentr, Leningrad (USSR).
For primary bibliographic entry see Field 02E.
W73-12055

ABSORPTION OF SOLAR RADIATION BY MELTING ICE COVER ON RIVERS AND RESERVOIRS (K VOPROSU O POGLOSHCHENII SOLNECHNOY RADIATSII TAYUSHCHIM LEDYANYM POKROVOM REK I VODOKHRANILISHCH),
Far Eastern Hydrometeorological Research Inst., Vladivostok (USSR).
V. M. Timchenko.
Meteorologiya i Gidrologiya, No 8, p 97-98, August 1972. 1 fig, 3 ref.

Descriptors: *Ice cover, *Solar radiation, *Absorption, *Rivers, *Reservoirs, Melting, Ice, Spring, Measurement, Curves, Equations.
Identifiers: *European USSR, *Ussuri River.

An empirical equation adopted at the USSR Hydrometeorological Center for calculating absorption of solar radiation by melting ice cover on rivers and reservoirs in European Russia was applied to ice cover on the Ussuri River near Kirovskiy in the Soviet Far East in spring seasons of 1970-71. The absorption curve obtained is characteristic of ice cover on rivers and reservoirs of the Maritime Territory and, possibly, of the entire Amur River basin. (Josefson-USGS)
W73-12058

AT INSTITUTES OF THE HYDROMETEOROLOGICAL SERVICE (V UCHREZHDENIYAKH GIDROMETSLUZHBY),
G. N. Khmaladze.
Meteorologiya i Gidrologiya, No 8, p 120-121, August 1972.

Descriptors: *Conferences, *Glaciers, *Snow cover, *Snowpacks, *Avalanches, Snowmelt, Mudflows, Synoptic analysis, Gravimetric analysis, Photogrammetry, Satellites (Artificial), Forecasting.
Identifiers: *Caucasus.

The Fifth Transcaucasian Scientific Conference was held in Baku, March 27-30, 1972, to study snow cover, snowpacks, snow avalanches, and glaciers in the Caucasus. Organized by the Transcaucasian Ice and Snow Commission of the Transcaucasian Hydrometeorological Scientific Research Institute, the conference was attended by over 100 delegates from various planning agencies and scientific research institutes in Tbilisi, Baku, and Yerevan. The problems discussed in the 50 papers of the conference included: (1) areal distribution of snow cover and snow avalanches in the Caucasus; (2) effect of synoptic processes on evolution of snow cover; (3) use of satellite data to improve methods for studying snow cover, avalanches, and glaciers; and (4) methods for computing and forecasting snowmelt-glacier runoff and avalanche hazards, methods of snow-avalanche control, etc. Problems relating to thermal conditions in alpine glacial basins, glacier conditions in the northern Caucasus, and gravimetric and stereophotogrammetric methods of glacier and glacial-mudflow investigations were discussed in about 30 papers devoted to glacier studies in the Caucasus. (Josefson-USGS)
W73-12059

MICROWAVE SIGNATURES OF FIRST-YEAR AND MULTIYEAR SEA ICE,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07B.
W73-12081

ATTENUATION OF SWELL BY SEA ICE,
Scott Polar Research Inst., Cambridge (England).
P. Wadhams.
Journal of Geophysical Research, Vol 78, No 18, p 3552-3563, June 20, 1973. 12 fig, 1 tab, 23 ref.

Descriptors: *Waves (Water), *Sea ice, *Rheology, *Ocean waves, Deformation, Strain, Elastic theory.
Identifiers: Wave attenuation.

A mechanism of steady-state creep is proposed to describe the attenuation rate of long-period ocean waves in fields of sea ice. This mechanism fits observations, provided a Glen-type flow law is employed with an exponent n±3 and a flow law parameter (B) similar to the value for polycrystalline ice near the melting point. (Knapp-USGS)
W73-12082

EDDY CORRELATION MEASUREMENTS OF EVAPORATION AND SENSIBLE HEAT FLUX OVER ARCTIC SEA ICE,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 02D.
W73-12083

SEASONAL REGIME AND HYDROLOGICAL SIGNIFICANCE OF STREAM ICINGS IN CENTRAL ALASKA,
D. L. Kane, and C. W. Slaughter.
Paper presented at International Symposia on the Role of Snow and Ice in Hydrology, UNESCO-Session 5, September 6-13, 1972, Banff, Canada. 14 p, 5 fig, 1 tab, 16 ref.

Descriptors: *Ice, *Streams, *Rivers, *Alaska, Arctic, Permafrost, Base flow, Melt water, Water storage.
Identifiers: *Icings, *Naleds.

Stream icings were monitored near the outlets of three subdrainages of the Caribou-Poker Creeks Research Watershed, north of Fairbanks, Alaska. The icings constituted 4% of yearly runoff volume, but amounted to nearly 40% of winter streamflow. Melt occurred over a four-week period, largely following ablation of the seasonal snowpack. Icings indicate sources of subsurface water yield. Icings are a means of water storage and delayed water yield during the ablation season. The influenc on water yield from upland basins is primarily in terms of timing. Icings persist long after disappearance of snow cover. In the absence of precipitation, melt of this stored ice constitutes the major addition to base flow of upland streams following melt of the snowpack. During the spring, the presence of these ice masses in valleys causes diversion of meltwater from single-channel streamflow to dispersed flow. Channels develop (or are maintained during icing formation) under and in the ice mass, as well as on the surface. (Knapp-USGS)
W73-12314

2D. Evaporation and Transpiration

EDDY CORRELATION MEASUREMENTS OF EVAPORATION AND SENSIBLE HEAT FLUX OVER ARCTIC SEA ICE,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
M. R. Thorpe, E. G. Banke, and S. D. Smith.
Journal of Geophysical Research, Vol 78, No 18, p 3573-3584, June 20, 1973. 10 fig, 2 tab, 18 ref.

Descriptors: *Sea ice, *Heat flow, *Evaporation, *Heat budget, Solar radiation, Heat transfer, Advection, Convection, Radiation, Mass transfer, Remote sensing, Instrumentation.

A sonic anemometer, lyman alpha humidiometer, and thermistor thermometer were operated on ice at 75N, 150W in March-April 1972 as part of the Aidjex pilot study. Spectra of temperature and humidity fluctuations and cospectra for the sensible and latent heat fluxes were similar to those for neutral conditions over sea and land. Bulk transfer coefficients were CT±0.0012 and CQ±0.00055. The Bowen ratio of sensible to latent heat fluxes ranges from 1 to 15 and can be obtained from values of the temperature and humidity spectra at low frequencies except when the latent heat flux is very small. These data were recorded at the spring equinox, and the dominant feature of the heat fluxes is their diurnal variation. Evaporation continued for several hours after the sensible heat flux changed to the downward direction. Over Robeson Channel in July 1972 the heat transfer coefficient was CT-0.001 for stable conditions. (Knapp-USGS)
W73-12083

2E. Streamflow and Runoff

STATISTICS OF OCEAN WAVE GROUPS,
Amoco Production Co., Tulsa, Okla.
K. G. Nolte, and F. H. Hsu.
Society of Petroleum Engineers Journal, Vol 13, No 3, p 139-146, June 1973. 9 fig, 4 ref, 2 append.

Descriptors: *Waves (Water), *Statistics, *Ocean waves, Statistical methods, Frequency, Time series analysis.
Identifiers: Wave forces (Ships).

The occurrence probability was calculated for the number and height of consecutive waves which are large compared with the average wave height. Such wave groups can create extreme forces in mooring lines of large vessels. All the parameters that describe the statistics of wave groups can be derived from the energy spectrum representing the sea state if the energy spectrum is assumed to contain only a narrow band of wave frequencies. Good agreement was found between the theoretical expressions and actual wave data. (Knapp-USGS)
W73-11817

ESTIMATING WATER LOSS AND DIRECT RUNOFF FROM STORM RAINFALL BY THE USE OF THE INFILTROMETER,
Geological Survey, Menlo Park, Calif.
J. T. Limerinos.
Geological Survey open-file report, February 20, 1973. 22 p, 7 fig, 4 tab, 15 ref.

Descriptors: *Storms, *Rainfall, *Storm runoff, *Water loss, Estimating, Methodology, Infiltrometers, Hydrologic data, Correlation analysis, Evaluation, River basins, California, Infiltration, Soil properties.

Infiltrometer data were used to estimate water losses in ungaged drainage basins during storms and to determine the direct runoff from design-storm rainfall. The infiltrometer was used in 14 selected drainage basins in California where short-term records of precipitation and streamflow were available. The data were used to obtain an infiltration-index value, which then was related to the minimum infiltration rate obtained from records of rainfall and runoff. The minimum infiltration rate was used with a regional relation between the storm-recurrence interval and the ratio of storm-infiltration rate to minimum-infiltration rate to provide a means for estimating the infiltration rate used with design storms of any specified recurrence interval. (Woodard-USGS)
W73-11823

FORMATION AND COMPUTATION OF COMPONENTS IN A RIVER REGIME (FORMIROVANIYE I RASCHETY ELEMENTOV REZHIMA REK),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02A.
W73-11825

MAXIMUM FLOOD DISCHARGES AND DEPTHS OF RUNOFF ON CARPATHIAN RIVERS (MAKSIMAL'NYYE RASKHODY I SLOI PAVODOCHNOGO STOKA REK KARPAT),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
P. M. Lyutik.
In: Formirovaniye i raschety elementov rezhima rek; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 119, p 3-18, Moscow, 1972. 3 fig, 4 tab, 20 ref.

Descriptors: *Floods, *Flood discharge, *Flood frequency, *Runoff, *Rivers, Storm runoff, Discharge (Water), Variability, Probability, Frequency curves, Equations.
Identifiers: *Carpathians.

Probabilities of various maximum flood discharges and of corresponding depths of runoff for Carpathian rivers were based on analysis and statisti-

cal processing of data from hydrometric observations. Data of maximum discharges in 1969-70 were used to refine long-term curves of maximum discharge, depth of runoff, and flood frequency for Carpathian rivers. Probabilities of various discharges were obtained by constructing frequency curves from the greatest annual discharges. Maximum rainfall runoff of 1% probability is 3-4 cu m/sec/sq km in upper reaches of the Lomnitsa, Bystritsa Solotvinskaya, Bystritsa Nadvornyanskaya, and Prut Rivers. Lowest maximum runoff values (<1 cu m/sec/sq km) were observed in the Strvyazh and Stryy River basins. The coefficients of variation of maximum discharges for Carpathian rivers range from 0.32 (Borzhava River at Dolgoye) to 1.52 (Dereluy River at Molodiya). The coefficients of asymmetry vary between 0.30 and 3.00 or more. Greatest depths of rainfall runoff of 1% probability (350 mm or more) occur in upper reaches of the Belaya Tisza, Bystritsa Solotvinskaya, and Svicha Rivers. Minimum depths (50-100 mm) occur on rivers in the Zakarpatskaya lowland. Coefficients are derived for converting maximum rainfall runoff of 1% probability to maximum rainfall runoff of other probabilities. (See also W73-11825) (Josefson-USGS)
W73-11826

A PRECIPITATION-BASED FORECAST OF GREAT STORM FLOODS ON MOUNTAIN TRIBUTARIES OF THE DNIESTER (PROGNOZ VYSOKIKH DOZHDEVYKH PAVODKOV GORNYKH PRITOKOV DNESTRA PO OSADKAM),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 06B.
W73-11829

NATURAL REGULATION OF RUNOFF ON RIVERS IN THE NORTHWESTERN UKRAINE (YESTESTVENNAYA ZAREGULIROVANNOST'STOKA REK SEVERO-ZAPADA UKRAINY),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
I. I. Voloshin.
In: Formirovaniye i raschety elementov rezhima rek; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 119, p 121-130, Moscow, 1972. 1 fig, 2 tab, 8 ref.

Descriptors: *Runoff, *Rivers, Streamflow, Base flow, Groundwater, Topography, Karst, Seasonal, Equations.
Identifiers: *Ukraine, *Natural regulation.

Seasonal regulation of river runoff in the northwestern Ukraine is described as the distribution of monthly runoff in percent of annual runoff, and as the coefficient of natural regulation describing the base flow contribution to total annual streamflow. Rivers in the Zhitomir and Volynskoye Poles'ye have approximately the same seasonal runoff distribution, with most runoff (60%-70%) occurring in the spring and smaller amounts during other seasons of the year. The average long-term value of the coefficient of seasonal regulation for rivers in the northwestern Ukraine varies between 0.30 and 0.80. Highest values occur in the southwest on northern slopes of the Volyno-Podol'skaya upland and lowest values in the east within the Ukrainian crystalline shield. For regions in the Volynskoye and Zhitomir Poles'ye, the coefficients of natural regulation are 0.40-0.50 and for the Volyno-Podol'skaya upland they are greater than 0.60. The importance of karst in the formation of runoff is well illustrated on the Volyno-Podol'skaya upland, where large inflows of groundwater result in high values of the coefficient of natural regulation and in a uniform monthly runoff distribution. The role of karst is less significant on the Volynskoye Poles'ye, where groundwater on the left bank of the Pripyat' discharges into the Dnieper-Bug Canal and into the Western Bug basin in the direction of the Mukhavets River. (See also W73-11825) (Josefson-USGS)
W73-11833

HYDROLOGIC DATA: 1971, VOLUME V: SOUTHERN CALIFORNIA.
California State Dept. of Water Resources, Sacramento.

Available from Calif Dept of Water Resources, P.O. Box 388, Sacramento, Calif 95802, Price $7.00. Bulletin No 130-71 December 1972. 503 p, 28 fig, 16 tab, 6 append.

Descriptors: *Hydrologic data, *Groundwater, *Surface waters, *California, Water resources, Climatic data, Streamflow, Discharge measurement, Gaging stations, Water wells, Well data, Water levels, Water quality, Chemical analysis, Waste water (Pollution), Data collections, Water resources development, Planning.
Identifiers: *Hydrologic data (Southern Calif).

The California Department of Water Resources maintains an extensive hydrologic data file in the district offices of each of its reporting areas. The data collection programs have been designed to supplement the information obtained by other agencies and cooperators to meet specific needs of the State. The data presented represent the continuing efforts of the department to compile and publish comprehensive, accurate, timely, and useful information on water quality and quantity of the State. Included are climatic data, surface water measurements, groundwater measurements, surface water quality, groundwater quality, and waste water data. (Woodard-USGS)
W73-11846

MEASUREMENTS OF CURRENTS,
Louisiana State Univ., Baton Rouge.
J. P. Schweitzer.
Available from NTIS, Springfield, Va 22151 as COM-73-10176, Price $3.00 printed copy, $1.45 microfiche. Louisiana State University Marine Science Teaching Aid, Issue 1, October 1972. 4 p, 7 fig, 6 ref.

Descriptors: *Stream gages, *Current meters, *Discharge measurement, *Water measurement, *Education, Schools (Education), Training, Environment.

Measuring the current velocity and volume of flow in a tidal canal, drainage ditch, or a small stream can be a useful and exciting field experiment for students of widely varying abilities. The experience can help develop such ecological concepts as the effects of precipitation on the watershed of a small stream, the relations of streamflow to the dimensions of the drainage basin, and seasonal changes in the flow of water through an aquatic ecosystem. The easiest way to measure the surface velocity is to place a cork or float in the current and to time the downstream passage of the float. A more interesting way of measuring surface velocity is the Thrupp method. If two nails are placed side by side in a flowing stream then the diverging ripples will intersect at some point downstream. The velocity of the current can be inferred from the relationship between the distance separating the two nails and the distance downstream where the diverging ripples intersect. Pitot tubes are also used to measure the velocity of fluid flow. Information about the volume of water moving through an aquatic ecosystem is easy to compute by several methods and may be more useful than measurements of speed alone. Weirs and geometric methods are recommended for school use in stream-gaging projects. (Knapp-USGS)
W73-11850

FORECASTING RUNOFF FROM UNIVERSAL SURFACE GAGE SNOWMELT MEASUREMENTS,
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
For primary bibliographic entry see Field 02C.
W73-11853

STUDIES OF CATION BUDGETS IN THE SOUTHERN APPALACHIANS ON FOUR EXPERIMENTAL WATERSHEDS WITH CONTRASTING VEGETATION,
National Science Foundation, Washington, D.C.
P. L. Johnson, and W. T. Swank.
Ecology, Vol 54, No 1, p 70-79, Winter 1973. 4 fig, 7 tab, 24 ref.

Descriptors: *Cations, *Forest watersheds, *Discharge (Water), *Appalachian Mountain Region, *Physical properties, *Demonstration watersheds, *Hydrology, Calcium, Magnesium, Potassium, Sodium, Mountain forests, Vegetation, Topography, Monitoring, Hardwood, Alkali metals, Alkaline earth metals, Regression analysis, Watersheds (Basins), Ecosystems, Precipitation (Atmospheric), Elevation, Fescues, Maple trees, White pine trees, Methodology, Streamflow, Chemical analysis, Oak trees, Hickory trees.
Identifiers: *Nutrient interchange, Quercus spp, Carya spp, Acer rubrum, Castanea dentata, Festuca elatior var. arundinacea, Liriodendron tulipifera, Cornus florida, Pinus strobus, Chestnut trees.

Nutrient fluxes within and through watershed ecosystems at the Coweeta Hydrologic Laboratory, Franklin, N.C. were studied. The annual budgets and seasonal fluctuations for selected cations are described. Concentrations and flux of cations moving through a hardwood forest stand, a weed to forest succession, a hardwood coppice stand and an eastern white pine stand on steep mountain topography are compared. Stream discharge was greater by 6 percent for the successional weed stand, and 10 percent for the second hardwood coppice, but 15 percent less for the young pine stand in contrast to pretreatment levels. Although concentrations for Ca, Mg, K, and Na combined were usually less than 3.5 ppm, over 98 percent of the loss of each cation was in dissolved form on all four watersheds. Regression analysis showed that 50 to 60 percent of the variations in monthly weighted average concentration was accounted for by monthly discharge amounts. Annual losses of the four cations from the mature hardwood stand were in the amounts of approximately 7, 3, 5 and 10 kg/ha respectively for the Ca, Mg, K, and Na. Annual budgets showed net changes to be -0.8, -1.8, -2.0, and -4.3 kg/ha, respectively, for this mature hardwood ecosystem. In contrast, the weed stand lost significantly greater amounts, and the young pine and hardwood coppice watersheds showed a net gain in Ca and significantly lower losses than the mature ecosystem for the other three ions. These budgets show that major alterations to these forest ecosystems are not now producing a substantial out-flux for these cations. (Holoman-Battelle)
W73-11860

MODELING IN THE EASTERN DECIDUOUS FOREST BIOME,
Oak Ridge National Lab., Tenn.
R. V. O'Neill.
Available from NTIS, Springfield, Va., as CONF-730313-1; $4.00 in paper copy, $1.45 in microfiche. Report CONF-730313-1, 1972. 40 p, 4 fig, 4 tab, 15 ref.

Descriptors: *Biomes, *Forecasting, *Mathematical studies, *Aquatic environment, Deciduous forests, Lake stages, Eutrophication, Nutrients, Ecology, Ecosystems, Reservoir stages, Ecotypes, Forest watersheds.

Integrated models are being developed and some subsystems are being utilized that include regeneration, mortality, and other processes affecting tree populations and water movement through the forest and into associated aquatic systems. A biomass model for the open-water portions of a lake was developed by researchers at Lake George and Lake Wingra sites. Development of submodels for aquatic nutrient concentration will be initiated. Simulation of the eutrophication of shallow lakes is under consideration. (Bopp-ORNL)
W73-11907

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM. VOLUME IV: AREA WIDE STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT,
Diversified Consultants, Inc., Jackson, Miss.
For primary bibliographic entry see Field 04C.
W73-12019

FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION,
National Weather Service, Salt Lake City, Utah. Western Region.
P. Williams, Jr., C. L. Glean, and R. L. Raetz.
Available from NTIS, Springfield, Va., 22151, as COM-73-10251 Price $3.00 printed copy; $1.45 microfiche. Technical Memorandum NWS, WR82, December 1972. 12 p, 23 ref.

Descriptors: *Flash floods, *Floods, *Warning systems, Flood forecasting, Flood protection, Stream gages, Radar.

Flash-flood warning procedures require interpretation of available climatological data for heavy rainfall. Warning of flash floods is largely an observational problem. Potential for occurrence of heavy rains can be forecast by synoptic means and used as a basis for a flash flood watch, but specific areas where excessive rains will fall cannot be realistically predicted in most cases and must be determined using radar and reports by witnesses. In areas with considerable potential for flash floods, networks of observers can be very helpful. Because of the erratic nature of flash flooding, such a network must ideally be very extensive in order to cover a reasonable fraction of the important watersheds. The most frequently used type of network involves the cooperation of state highway patrol, state highway maintenance crews, sheriffs' offices, fire departments, and other public employees. Use of alarm gages can be very effective, and there are many places in the western region which could use these gages to advantage. (Knapp-USGS)
W73-12020

RESISTANCE LOSSES IN NONCIRCULAR FLOOD CONTROL CONDUITS AND SLUICES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 08B.
W73-12027

FLOW AND CHEMICAL CHARACTERISTICS OF THE ST. JOHNS RIVER AT JACKSONVILLE, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 02L.
W73-12030

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR MOUNTAIN CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Dallas, Tex. Water Resources Div.
H. D. Buckner.
Geological Survey open-file report, May 1973. 10 p, 1 fig.

Descriptors: *Hydrologic data, *Streamflow, *Reservoirs, *Texas, River basins, Rainfall, Runoff, Flow rates, Stream gages, Lakes, Inflow, Basic data collections.
Identifiers: *Mountain Creek (Tex), *Tarrant County (Tex), Reservoir content.

Records of streamflow and reservoir content for the 1971 water year are presented for the Mountain Creek, Texas, hydrologic system. Mountain Creek drains the northeast corner of Johnson County, the northwest corner of Ellis County, the southeast corner of Tarrant County, and part of the southwest corner of Dallas County. The basin is 30 miles long and averages 10 miles in width. The total drainage area at the mouth is 304 square miles. Basin outflow for the 1971 water year was 13,670 acre-feet. Storage in Mountain Creek Lake showed a net loss of 1,070 acre-feet during the water year. Rainfall over the study area for the 1971 water year was about 24 inches, which is about 10 inches less than the long-term mean for the area. (Woodard-USGS)
W73-12038

INVESTIGATION OF EFFECT OF SOIL FREEZING DEPTH AND OTHER FACTORS ON SNOWMELT RUNOFF ON RIVERS IN STEPPE AND FOREST-STEPPE ZONES (ISSLEDOVANIYE VLIYANIYA GLUBINY PROMERZANIYA POCHVY I DRUGIKH FAKTOROV NA TALYY STOK REK STEPNOY I LESOSTEPNOY ZON),
Gidrometeorologicheskii Nauchno-Issledovatelskii Tsentr, Leningrad (USSR).
V. D. Komarov, and T. T. Makarova.
Meteorologiya i Gidrologiya, No 8, p 67-74, August 1972. 2 fig, 7 ref.

Descriptors: *Snowmelt, *Runoff, *Rivers, *Soils, *Freezing, Depth, Soil moisture, Water storage, Water equivalent, Floods, River basins, Grasslands, Forests, Equations.

Investigations of the effect of soil freezing on absorption of melting snow by river basins in the southern half of European Russia were based on 1948-70 observation data of the Pridesnyanskaya station for the Golovesnya River basin (drainage area--29.5 sq km), and of the Nizhnedevitskaya station for the Devitsa River basin (drainage area--76.0 sq km). Relations are obtained relating maximum possible snowmelt losses to both soil freezing depth and soil moisture and to anomalous melt periods. The accuracy of computing snowmelt losses from the established relations is high. (Josefson-USGS)
W73-12055

PATTERNS OF STREAM-DISCHARGE VARIABILITY (ZAKONOMERNOSTI V IZMENENII MODULYA STOKA),
Bulgarian Academy of Sciences, Sofia. Inst. of Hydrology and Meteorology.
G. I. Gergov.
Meteorologiya i Gidrologiya, No 8, p 75-81, August 1972. 4 fig, 12 ref.

Descriptors: *Discharge (Water), *Runoff, *Variability, Discharge measurement, Watersheds (Basins), Areal, Elevation, Curves, Equations.
Identifiers: *Bulgaria, Isolines.

A study was made of some stream-discharge characteristics and methods of discharge determination in Bulgaria. The effect of basin morphometry on maximum discharges is discussed, and graphs are constructed of empirical relations relating maximum discharge to both basin area and elevation. (Josefson-USGS)
W73-12056

APPLICATION OF THE SOURCE-AREA CONCEPT OF STORM RUNOFF TO A SMALL ARIZONA WATERSHED,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02A.
W73-12067

ATTENUATION OF SWELL BY SEA ICE,
Scott Polar Research Inst., Cambridge (England).
For primary bibliographic entry see Field 02C.
W73-12082

SOME KINETIC ENERGY SPECTRA IN A NEARSHORE REGION OF LAKE ONTARIO,
Ontario Ministry of the Environment, Toronto.
M. D. Palmer.
Journal of Geophysical Research, Vol 78, No 18, p 3585-3595, June 20, 1973. 9 fig, 4 tab, 18 ref.

Descriptors: *Waves (Water), *Currents (Water), *Seiches, *Lake Ontario, *Turbulence, Current meters, Water circulation, Thermocline.
Identifiers: Kinetic energy spectra.

The nearshore kinetic energy spectrum measured at 5.3 meters below the surface in 9 m of water on Lake Ontario is different in shape from that measured farther offshore in the epilimnion at 5.8 m below the surface in 22 m of water. The nearshore spectrum approximates a slope of -3.0, which is similar to that for a boundary layer. The spectrum reflects the lake seiche periodicities. Farther offshore the spectrum approximates a slop of -1.6. Energy in the nearshore region is present at lower wave numbers than energy in a similar offshore region, and the integral scale in the nearshore region (2.4 m) is approximately half that in the offshore region (4.3 m). (Knapp-USGS)
W73-12084

FLOOD PLAIN INFORMATION, LEHIGH RIVER, JORDAN CREEK AND TROUT CREEK, CITY OF ALLENTOWN, PENNSYLVANIA.
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 04A.
W73-12238

FLOOD PLAIN INFORMATION, LITTLE LEHIGH CREEK, CEDAR CREEK, LITTLE CEDAR CREEK, ALLENTOWN, PENNSYLVANIA.
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 04A.
W73-12239

A COMPREHENSIVE ANALYSIS OF A MAJOR STORM AND ASSOCIATED FLOODING IN ARIZONA,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 02B.
W73-12242

FLOOD EVALUATION - CAN STOCHASTIC MODELS PROVIDE AN ANSWER,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 07C.
W73-12276

HYDROLOGIC FORECASTING WITH SEQUENTIAL DETERMINISTIC AND STOCHASTIC STAGES,
Water Resources Board, Reading (England).
For primary bibliographic entry see Field 04A.
W73-12280

STREAMFLOW FREQUENCY USING STOCHASTICALLY GENERATED HOURLY RAINFALL,
CH2M/Hill, Bellvevue, Wash.
R. F. Ott, and R. K. Linsley.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water

Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p230-244, 1972. 8 fig, 3 tab, 16 ref.

Descriptors: *Streamflow, *Frequency analysis, *Stochastic processes, *Monte Carlo methods, *Flood peak, *Hydrology, Watersheds (Basins), Mathematical models, Systems analysis, *Risks.

To investigate the uncertainity of the return period of extreme floods, a rainfall synthesis model by Franz (1970) is employed to generate 500 years of multistation hourly rainfall for two watersheds in the United States. This rainfall is then converted to streamflow by a deterministic watershed mode. Once the 500 years of hourly streamflow are available for each watershed, the Gumbel and the Log-Pearson Type III methods of frequency analysis are performed on each series. In deriving the parameters for the Gumbel Extreme Value Distribution, comparison is made between the methods of moments and maximum likelihood. For the Log-Pearson III analysis, the effects of the applications of the coefficient of skewness and adjusting for length of record are studied. Monte Carlo techniques are employed to determine the uncertainity of extrapolating these methods to estimate flood peaks from streamflow records of various lengths. (See also W73-12269) (Bell-Cornell)
W73-12284

EFFECT OF LENGTH OF RECORDS OF MONTHLY FLOWS ON THE FIRST SERIAL CORRELATION COEFFICIENT,
Asian Inst. of Tech., Bangkok (Thailand).
S. Pinkayan.
In: Proceedings (Vol. I), International Symposium on Uncertanties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 245-252, 1972. 4 fig, 9 ref.

Descriptors: *Streamflow, *Hydrologic data, *Simulation analysis, *Markov processes, Monthly, Flows, Time series analysis, Mathematical models, Systems analysis.
Identifiers: *Thailand.

In developing countries, most streamflow data has been recorded for a short period of time. Current water resource projects are investigated by means of mathematical simulations. Streamflow sequences which are the input of the simulation model are synthesized on the basis of preservating a certain fundamental statistics of the historical records, such as mean, standard deviation, and serial correlation. The accuracy of the results from simulation depends upon the reliability of the estimation of these statistical parameters which implies that they depend upon the lengh of records. Among these three statistical parameters, serial correlation, which is a measure of the correlation between the successive observations, is of great importance. The investigation of the effect of length of records on the first serial correlation is made by an analysis of monthly flows at a selected station in Thailand. The monthly flow sequences were made to be stationary by means of normalization, which is obtained by deducting the monthly long term mean from each monthly value and dividing the result by the long term standard deviation of that month. The normalized time series are assumed to follow the first order Markov process. The expectation of the first serial correlation coefficient of the normalized time series increases when the length of records was made longer. Its variance decreases when the recorded length increases. (See also W73-12269) (Bell-Cornell)
W73-12285

STOCHASTIC STREAM TEMPERATURE MODEL,
Bonneville Power Administration, Portland, Oreg.
For primary bibliographic entry see Field 04A.
W73-12289

THE DIRECTIONAL ANALYSIS OF OCEAN WAVES: AN INTRODUCTORY DISCUSSION (SECOND EDITION),
Naval Coastal Systems Lab., Panama City, Fla.
C. M. Bennett.
Available from NTIS, Springfield, Va 22151 as AD-753 825 Price $3.00 printed copy; $1.45 microfiche. Informal Report NCSL 144-72, December 1972. 81 p, 8 fig, 18 ref, 3 append. (formerly NSRDL/PC3472).

Descriptors: *Ocean waves, Oceanography, *Winds, *Waves (Water), *Wavelengths, Mathematical models, Systems analysis, Computer programs, Input-output analysis, Ocean currents, Equations.
Identifiers: *Wave directional analysis.

An introductory discussion of the mathematics behind the directional analysis of ocean waves is presented. There is sufficient detail for a reader interested in applying the methods' further, the report can serve as an entry into the theory. The presentation is basically tutorial but does require a reasonably advanced mathematical background. Results of a program for the measurement of directional ocean wave bottom pressure spectra are included as an appendix. This second edition makes corrections to the first and adds some details of an iterative directional analysis method. The least square method of using the information in a spectral matrix is probably the best method presently available. Examples of such analyses can be found in several of the papers in the bibliography. A collection of ocean-wave induced, bottom pressure directional spectra from these papers is given. Some details of the least square method are given along with sample result and a FORTRAN program for the method. (Woodard-USGS)
W73-12306

NUMERICAL MODEL STUDIES OF THE ST. LAWRENCE RIVER,
National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering.
For primary bibliographic entry see Field 02L.
W73-12313

SEASONAL REGIME AND HYDROLOGICAL SIGNIFICANCE OF STREAM ICINGS IN CENTRAL ALASKA,
For primary bibliographic entry see Field 02C.
W73-12314

2F. Groundwater

STUDIES OF SAPROLITE AND ITS RELATION TO THE MIGRATION AND OCCURRENCE OF GROUNDWATER IN CRYSTALLINE ROCKS,
Georgia Univ., Athens. Dept. of Geology.
For primary bibliographic entry see Field 02G.
W73-11706

SUBSURFACE INDUSTRIAL WASTE WATER INJECTION IN ILLINOIS,
Ohio River Valley Sanitation Commission, Cincinnati. Committee on Subsurface Industrial Waste Water Injection.
For primary bibliographic entry see Field 05E.
W73-11820

TIME LAG RESPONSE IN BOULDER CLAY WELLS,
Hull Univ. (England). Dept. of Geography.
M. Bonell.
Nordic Hydrology, Vol 4, No 2, p 86-104, 1973. 4 fig, 2 tab, 24 ref.

Descriptors: *Water level fluctuations, *Time lag, *Till, *Rainfall, *Evapotranspiration, Water balance, Statistics, Statistical methods, Recharge, Discharge (Water), Hydrogeology, Aquifer characteristics, Hydrographs, Hydrograph analysis.

In a small boulder clay catchment, a time lag response to rainfall and potential evapotranspiration was measured. A statistical method to detect this time lag and therefore translate this mechanism into quantitative terms was tested. The analysis proved to be very successful despite some defects in the original data. The results confirm the general trends indicated in hydrograph and contour map analyses. The statistical analysis consisted of intercorrelation of well levels and generation of a stream of simple correlations between individual well fluctuations and antecedent 3-day running means of the hydrometeorological data. (Knapp-USGS)
W73-11842

ON THE GROUND-WATER DISCHARGE TO THE BALTIC SEA AND METHODS FOR ESTIMATING IT,
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
I. S. Zektzer.
Nordic Hydrology, Vol 4, No 2, p 105-118, 1973. 1 fig, 2 tab, 13 ref.

Descriptors: *Discharge (Water), *Groundwater, *Water balance, Base flow, Surface-groundwater relationships, Europe.
Identifiers: *Baltic sea.

Methods for quantitatively estimating groundwater discharge to the Baltic Sea and the possibilities of applying these methods to investigations of the role of groundwater in the water and salt balances of the Baltic Sea are discussed. The combined hydrological and hydrogeological method, the hydrodynamic method, and the method of the average long-term water balance of recharge areas are recommended. Data on the groundwater discharge to the Baltic Sea from the zone of intensive circulation (relatively shallow aquifers) within the USSR, are presented. The groundwater discharge from the zone of intensive circulation within the area of the USSR estimated by the combined hydrological and hydrogeological method, amounts to 38.5 cu m/sec. The groundwater discharge from the zone of intensive circulation of the Baltic artesian basin, within which the principal part of submarine groundwater outflow is formed, amounts to about 35 cu m/sec or about 6.5% of the total of fresh groundwater discharge of this basin (Zektzer 1968). The surface-water discharge from the Baltic artesian basin amounts to 78.8 cu km/year. Thus the groundwater discharge to the Baltic Sea from upper aquifers amounts to about 1.5% of the total streamflow. The total value of salt transport to the Baltic Sea from the zone of intensive circulation amounts to about 500,000 t/year. About 200 tons of salts are discharged annually with groundwater on every linear kilometer of the coast. (Knapp-USGS)
W73-11843

HYDROLOGIC DATA: 1971, VOLUME V: SOUTHERN CALIFORNIA.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 02E.
W73-11846

MAJOR AQUIFERS AND SAND AND GRAVEL RESOURCES IN DAY COUNTY, SOUTH DAKOTA,
South Dakota State Geological Survey, Vermillion.
D. I. Leap.
Information Pamphlet No 3, 1972. 4 p, 4 fig, 1 tab, 1 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Sands, *Gravels, *South Dakota, Water yield, Water quality, Sand pits, Sites, Sediments, Geology.
Identifiers: *Sand and gravel resources (S Dak).

The general distribution, quality, and physical characteristics of the major aquifers in Day County, South Dakota, the general distribution of sand and gravel resources in Day County, and the optimum areas in the County to explore for further development of sand and gravel resources are described. Day County contains three distinctly different major outwash aquifers--the Lynn, Lonesome Lake, and Eastern Lakes system. Production from a properly designed, gravel-packed well in the Lynn aquifer could be expected to be around 500 gallons per minute. The water in the Lynn aquifer is quite high in sulfate, calcium, and bicarbonate. The Lonesome Lake aquifer should produce 150 gpm with a properly designed well. (Woodard-USGS)
W73-11847

ISOTOPE METHODS IN GROUNDWATER SCIENCE (ISOTOPENMETHODEN IN DER GRUNDWASSERKUNDE),
European Atomic Energy Community, Brussels (Belgium). Bureau Eurisotop.
W. Drost, H. Moser, F. Neumaier, and W. Rauert.
Available from NTIS Springfield, Va., as EURISOTOP-61; $7.60 in paper copy, $1.45 microfiche. Report EURISOTOP 61, May 1972. 183 p, 66 fig, 6 tab, 300 ref.

Descriptors: *Groundwater movement, *Hydrogeology, *Aquifer characteristics, *Radioisotopes, Tracers, Water table, Natural recharge, Radioactivity techniques, Fallout, Methodology, Reviews, Bibliographies, Boreholes, Hydrology, Inflow, Surface-groundwater relationships, On-site investigations, Soil water, Instrumentation, Soil moisture, Oxygen isotopes, Tritium, Reviews.

The principal coverage of this review is the point-dilution method for measuring the rate and direction of groundwater flow, also called the single-borehole method (E. Gaspar and M. Oncescu, Radioactive Tracers in Hydrology, Elsevier Publishing Co., N.Y., 1972), and multiple borehole methods. Brief discussion is given to use of gamma and neutron sources in measuring soil moisture and the water table, and use of cosmogenic (018) and nuclear-weapons-testing-fallout (tritium) radionuclides to trace the origin of natural waters. (Bopp-ORNL)
W73-11929

EXTENT OF DEVELOPMENT AND HYDROLOGIC CONDITIONS OF THE ALLUVIAL AQUIFER, FOUNTAIN AND JIMMY CAMP VALLEYS, COLORADO, 1972,
Geological Survey, Denver, Colo.
D. L. Bingham, and J. M. Klein.
Colorado Water Resources Circular No 16, 1973. 28 p, 5 fig, 2 plate, 2 tab, 9 ref.

Descriptors: *Groundwater resources, *Hydrogeology, *Aquifer characteristics, *Water wells, *Colorado, Hydrologic data, Water yield, Water quality, Water types, Well data, Water levels, Water utilization, Irrigation wells, Municiapal water, Observation wells, Maps, Hydrographs, Specific conductivity.
Identifiers: *Fountain valley (Colo).

Groundwater development of the Fountain Creek alluvium of the Fountain Valley (Colorado Springs to Pueblo, Colo.) increased markedly during the early 1950's. Groundwater provides water for municipal, industrial, irrigation, and domestic uses. In 1972 about 270 wells were reported to yield more than 100 gallons per minute. Groundwater withdrawal for all uses during 1971 is estimated to be 18,000 acre-feet. Water levels in the spring of 1972 are about the same as those measured from 1954-57. The specific conductance of the groundwater ranges from about 500 to about 3,400 micromhos per centimeter and generally increases in a downstream direction. (Woodard-USGS)
W73-12023

POTENTIAL FOR GROUND WATER POLLUTION FROM THE LAND DISPOSAL OF SOLID WASTES,
Marquette Univ., Milwaukee, Wis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-12025

HYDROLOGIC RECONNAISSANCE OF PILOT VALLEY, UTAH AND NEVADA,
Geological Survey, Salt Lake City, Utah.
J. C. Stephens, and J. W. Hood.
Utah Department of Natural Resources Technical Publication No 41, 1973. 38 p, 4 fig, 1 plate, 11 tab, 43 ref, append.

Descriptors: *Hydrologic data, *Groundwater resources, *Water wells, *Hydrogeology, *Utah, Nevada, Hydrology, Water quality, Precipitation (Atmospheric), Snowmelt, Irrigation wells, Withdrawal, Water yield, Groundwater recharge, Evapotranspiration, Aquifer characteristics, Geology, Climatic data, Basic data collections, Water level fluctuations.
Identifiers: *Pilot Valley (Utah and Nev).

Pilot Valley is an area of about 470 square miles in southwestern Box Elder and northwestern Tooele Counties, Utah, and eastern Elko County, Nevada. The valley is bounded on the east and south by the Silver Island Range, and on the west by the Pilot Range. The bottom of the valley, about two-thirds of which is a barren alkali flat, is part of the Great Salt Lake Desert. The climate is arid to semiarid. The principal source of runoff and groundwater recharge is the snowpack that accumulates on the mountains in winter. Annual groundwater recharge is estimated to be 7,500 acre-feet. About 3,400 acre-feet of recharge is derived from precipitation on the area above an altitude of 5,600 feet. The remaining 4,100 acre-feet of recharge is groundwater inflow from adjacent areas. Annual discharge of groundwater approximately equals annual recharge. The groundwater reservoir above an altitude of about 4,250 feet contains water of satisfactory quality for most uses. Below 4,250 feet, water in the alluvial deposits is generally too saline for most uses. (Woodard-USGS)
W73-12029

GROUND-WATER RESOURCES OF RAINS AND VAN ZANDT COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
D. E. White.
Texas Water Development Board Report 169, April 1973. 81 p, 26 fig, 6 tab, 35 ref.

Descriptors: *Groundwater resources, *Hydrogeology, *Aquifer characteristics, *Water quality, *Texas, Water wells, Well data, Water utilization, Withdrawal, Water yield, Groundwater recharge, Geology, Irrigation wells, Industrial water, Municipal water, Domestic water, Hydrologic data, Water levels.
Identifiers: *Rains County (Tex), *Van Zandt County (Tex).

Rains and Van Zandt Counties in northeast Texas have abundant water resources and comparatively little water demand. The water is derived from the heavy precipitation (about 43 inches annually) which fills the numerous lakes and reservoirs and recharges the freshwater aquifers. One of the aquifers in the area, the Carrizo-Wilcox, has been appreciably developed. During 1969, this aquifer supplied a reported 1,500 acre-feet of water for municipal supply, industrial use, and rural water systems in the two counties. The Carrizo-Wilcox aquifer contains an estimated 50 million acre-feet of fresh to slightly saline water in storage. About 10% of this amount, or 5 million acre-feet, is available to wells. In addition to the water in storage, the Carrizo-Wilcox aquifer annually receives an estimated 5,000 acre-feet of effective recharge from precipitation. Yields of wells tapping the Carrizo-Wilcox aquifer range from less than 5 to as much as 600 gpm. Most of the municipal and industrial wells are equipped to pump at rates of 100 to 250 gpm. A second aquifer, the Queen City Sand, in southeastern Van Zandt County, which is currently tapped solely for rural domestic and livestock supply, is probably capable of yielding as much as 150 gpm of freshwater to properly constructed wells. (Woodard-USGS)
W73-12031

GROUND-WATER RESOURCES OF WHEELER AND EASTERN GRAY COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
M. L. Maderak.
Texas Water Development Board Report 170, May 1973. 67 p, 11 fig, 7 tab, 11 ref.

Descriptors: *Groundwater resources, *Hydrogeology, *Aquifer characteristics, *Water wells, *Texas, Water quality, Well data, Water utilization, Water supply, Irrigation wells, Industrial water, Municipal water, Domestic water, Withdrawal, Pumping, Water yield, Groundwater recharge, Geology, Hydrologic data, Water levels.
Identifiers: *Wheeler County (Tex), *Gray County (Tex).

Wheeler and eastern Gray Counties are in the east-central part of the Texas Panhandle. The Ogallala Formation, the principal source of fresh groundwater in the area, supplies nearly all the water for municipal supply and slightly more than half of the water used for irrigation. The Blaine Formation and the Whitehorse Group are sources of water principally for irrigation. Groundwater pumpage in 1966 was about 10,200 acre-feet, an increase of nearly three times the amount pumped in 1955. Of the pumpage in 1966, 6,900 acre-feet was for irrigation. The withdrawals of groundwater since at least 1955 apparently have not caused a serious decline in the water table or in the amount of water in storage. The Ogallala Formation yields water that generally contains less than 500 mg/liter dissolved solids and is the calcium bicarbonate type. The water from the Blaine Formation and Whitehorse Group, which is unsuitable for domestic or municipal supplies, is more highly mineralized and is of the calcium sulfate type. The water is used for irrigation seemingly without detrimental effect. On the basis of the capacity of the Ogallala Formation to transmit water under the present hydraulic gradient, about 15,000 acre-feet per year is moving through the aquifer. (Woodard-USGS)
W73-12032

GROUND-WATER RESOURCES OF THE MORA RIVER DRAINAGE BASIN, WESTERN MORA COUNTY, NEW MEXICO,
Geological Survey, Santa Fe, N. Mex.
J. W. Mercer, and E. G. Lappala.
Available from NITS, Springfield, Va 22151 as COM-73 10352 Price $3.00 printed copy; $1.45 microfiche. New Mexico State Engineer Technical Report 37, 1972. 91 p, 16 fig, 2 plate, 5 tab, 29 ref, 8 append.

Descriptors: *Groundwater resources, *Irrigation water, *New Mexico, *Water wells, *Aquifer characteristics, Hydrogeology, Well data, Water level fluctuations, Water quality, Chemical analysis, Climatic data, Economic aspects, Water resources development, Groundwater movement, Water yield, Groundwater recharge, Streams, Precipitation (Atmospheric), Hydrologic data.

Identifiers: *Mora County (N Mex), *Mora River Drainage Basin (N Mex).

Shortages of surface water for irrigation during the latter part of the growing season have limited agricultural development in western Mora County in northwestern New Mexico. The possibilities are described for developing groundwater for supplementary use. In nearly all of the Mora River drainage, unconsolidated Quaternary deposits of alluvial, colluvial, lacustrine, and glacial origin fill the stream valleys and contain groundwater. Thicknesses of these deposits range from a few feet in tributary valleys to more than 300 feet in the Mora Valley in western Mora County. Groundwater development appears to be feasible in the alluvial valley near Watrous. Unconsolidated deposits in this area are relatively homogeneous and isotropic. Transmissivity values range from 3,400 to 20,000 sq ft/day, and the assumed maximum storage coefficient value is 0.2. The amount of groundwater in storage is about 4,000 acre-feet. Annual withdrawals taken from aquifer storage by pumpage would be substantially replaced by recharge from the river and by return flow from irrigation water. The chemical quality of both surface and groundwater throughout the alluvial valleys of western Mora County meets the established criteria for irrigation use. (Woodard-USGS)
W73-12035

THE EFFECTS OF PLUGGING A DEEP ARTESIAN WELL ON THE CONCENTRATION OF CHLORIDE IN WATER IN THE WATER-TABLE AQUIFER AT HIGHLAND ESTATES, LEE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
D. H. Boggess.
Geological Survey Open-file Report 73003, 1973. 20 p, 5 fig.

Descriptors: *Saline water intrusion, *Artesian wells, *Water pollution treatment, *Florida, Water pollution sources, Chlorides, Saline water, Water wells, Recharge, Leaching.
Identifiers: *Lee County (Fla).

Upward leakage of saline water from deep artesian wells has caused widespread deterioration in quality of water in the shallow artesian aquifers underlying Lee County, Florida. The water-table aquifer has been affected similarly when saline water from the deep artesian wells has been allowed to discharge at the surface, or when corroded well casings have developed leaks at shallow depth. In January 1968 chloride concentrations ranging from 200 to 590 mg/liter were determined in four shallow wells drilled to the water-table aquifer at Highland Estates. After the artesian well was plugged in February 1968 the chloride in the water from the affected shallow wells decreased rapidly and by August 1968 ranged from 80 to 245 mg/liter. By October 1969 the chloride concentrations had decreased to 60-80 mg/liter. More than 4 years after plugging, some residual effect of the saline water still remained. However, the chloride concentration in the two wells nearest the source of saline water was within the normal range of concentrations determined for the water-table aquifer in the area. The natural processes of flushing and dilution should dissipate all the effects of the saline water. (Knapp-USGS)
W73-12039

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS: VOLUME I,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 05E.
W73-12051

HYDROLOGIC SIGNIFICANCE OF LITHOFACIES OF THE CANE RIVER FORMATION OR EQUIVALENTS OF ARKANSAS, LOUISIANA, MISSISSIPPI, AND TEXAS,
Geological Survey, Washington, D.C.
J. N. Payne.
Available from GPO, Washington, DC 20402 - Price $10.90. Geological Survey Professional Paper 569-C, 1972. 17 p, 4 fig, 16 plate (bound separately), 1 tab, 61 ref.

Descriptors: *Hydrogeology, *Gulf Coastal Plain, *Sandstones, Arkansas, Louisiana, Mississippi, Texas, Recharge, Water yield, Groundwater resources, Groundwater movement, Water quality, Water chemistry.
Identifiers: *Cane River Formation.

The study of the Cane River Formation and its equivalents is part of an investigation of the geohydrology of the Claiborne Group of the Gulf Coastal Plain. The thickness of the Cane River Formation ranges from 70 feet in La Salle Parish, La., to 750 feet in the Desha basin of Arkansas. The coefficient of permeability probably increases with increase in thickness. Recharge of the Cane River is mainly by precipitation in the outcrop area, but a minor amount of recharge takes place by the upward movement of water from the underlying Meridian-upper Wilcox aquifer. Regional flow of water is generally down the dip. In and near the outcrop area, water from the Cane River Formation contains proportionately high concentrations of calcium and magnesium. Farther downdip, sodium is the dominant cation. In Mississippi the dominant anion is bicarbonate. In Arkansas and Louisiana the chloride anion occurs in significant proportions. Recharge of the Reklaw and Queen City Formations takes place by infiltration of precipitation in the outcrop area, by infiltration of water from streams, and by upward movement of water from the Carrizo Sand. The distribution of solutes reflects the extent of flushing by freshwater. (Knapp-USGS)
W73-12053

GROUNDWATER RECHARGE THROUGH THE ZONE OF AERATION IN A SANDY DESERT (PITANIYE GRUNTOVYKH VOD PESCHANOY PUSTYNI CHERZ ZONU AERATSII),
V. N. Chubarov.
Izdatel'stvo 'Nedra', Moscow, 1972. 136p.

Descriptors: *Groundwater recharge, *Zone of aeration, *Deserts, *Sands, Soils, Vegetation, Soil moisture, Soil temperature, Infiltration, Evapotranspiration, Equilibrium, Water balance, Rainfall, Freshwater, Water table, Water level fluctuations, Water vapor, Analytical techniques, Instrumentation, Maps.
Identifiers: *Karakum Desert, Barchans, Moisture potentials, Capillary-potential relationships, Mineralization.

Characteristics of water transfer in the zone of aeration of a sandy desert were investigated in the Yaskhan region of the Karakum Desert in Turkmenistan. The presence of fresh groundwaters in the desert is mainly associated with exchange of water with the atmosphere through the zone of aeration. Methods are presented for estimating amounts of recharge from rainfall and for determining parameters of water transfer by centrifugation of soil samples and analysis of the moisture field. Data on conditions that influence recharge through the zone of aeration (infiltration, evaporation, transpiration, and equilibrium) are tabulated, diagrammed, and mapped. (Josefson-USGS)
W73-12061

GEOLOGY FOR PLANNING IN ST. CLAIR COUNTY, ILLINOIS.
Illinois State Geological Survey, Urbana.

Illinois State Geological Survey Circular 465, 1971. A. M. Jacobs compiler. 35 p, 4 fig, 8 tab, 63 ref.

Descriptors: *Geological surveys, *Mining, *Groundwater resources, *Mississippi River, *Illinois, Land management, Water quality control, Waste disposal, Mine wastes, Strip mine wastes, Spoil banks, Water pollution sources, Water quality, Hydrogeology, Water yield, Data collections, Maps, Planning.
Identifiers: *St. Clair County (Ill).

St. Clair County lies in southwestern Illinois across the Mississippi River from St. Louis, Missouri. One-fifth of the total land surface of 673 square miles is on flood plains of the Mississippi and Kaskaskia Rivers and Silver Creek. The flood plains are underlain by as much as 120 feet of gravel, sand, silt, and clay. The remaining four-fifths of the land surface is on uplands that contain flat or dissected plains, low ridges and mound-shaped hills, about 20 square miles of strip mines, and an area of karst topography. Mineral and water resources are abundant in the county. Water resources include groundwater from near-surface unconsolidated deposits and from bedrock and surface water from the Mississippi River. In some areas geologic conditions impose limitations on the use of land for construction and the disposal of waste, whereas in other areas no particular problems preclude use for those purposes. Rarely are the limitations severe enough that they cannot be overcome by available engineering and construction techniques. This geologic information was prepared for land-use and resource planning on a county-wide scale. (Woodard-USGS)
W73-12069

PHYSICAL ASSUMPTIONS AND THEIR CONSEQUENCES ON MODELLING GROUNDWATER MOVEMENT,
For primary bibliographic entry see Field 04B.
W73-12288

HYDROGEOLOGIC CHARACTERISTICS OF THE VALLEY-FILL AQUIFER IN THE JULESBURG REACH OF THE SOUTH PLATTE RIVER VALLEY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
R. T. Hurr, and P. A. Schneider, Jr.
Geological Survey open-file report, 1972. 2 p, 6 sheet, 1 fig, 6 plate, 4 ref.

Descriptors: *Hydrologic data, *Hydrogeology, *Aquifer characteristics, *Valleys, *Colorado, Geomorphology, Alluvial aquifers, Water wells, Bedrock, Water table Transmissivity, Maps.
Identifiers: *South Platte River Valley (Colo), Julesburg Reach, Stream depletion, Hydrologic atlas.

This hydrologic atlas of the Julesburg Reach of the South Platte River Valley, Colorado, contains 6 maps, scale one mile to the inch showing: (1) location of wells in the Julesburg reach of the South Platte River Valley, Colorado, 1968; (2) map showing bedrock configuration beneath the valley-fill aquifer in the Julesburg reach of the South Platte River Valley, Colorado; (3) map showing water table contours of the valley-fill aquifer in the Julesburg reach of the South Platte River Valley, Colorado, March 1968; (4) map showing saturated thickness of the valley-fill aquifer in the Julesburg reach of the South Platte River Valley, Colorado, March 1968; (5) map showing transmissivity of the valley-fill aquifer in the Julesburg reach of the South Platte River Valley, Colorado; and (6) map showing stream-depletion-factor of the valley-fill aquifer in the Julesburg reach of the South Platte River Valley, Colorado. (Woodard-USGS)
W73-12296

THE EVALUATION AND APPLICATION OF C--14 DATING OF GROUNDWATER,
Geological Survey, Washington, D.C.
F. J. Pearson, Jr.

Available from NTIS, Springfield, Va 22151 as AD-748 877 Price $3.00 printed copy; $1.45 microfiche. Final Project Report to Army Research Office (No 5830.6-EN), 1972. 70 p, 22 fig, 5 tab, 39 ref.

Descriptors: *Radioactive dating, *Carbon radioisotopes, *Groundwater, *Groundwater movement, *Hydrology, Carbonates, Analytical techniques, Soil types, Hydrogeology, Geochemistry.
Identifiers: *Carbon-14.

The carbon-14 method is a useful addition to the techniques for the study of groundwater hydrology. To use it successfully requires an understanding of the carbonate chemistry of the systems being investigated. To adjust C-14 measurements the proportion of soil air to aquifer-derived carbonate species must be known. In systems in which marine limestone is the only carbonate derived from the aquifer, C-13 values of the dissolved carbonate can be used to determine this proportion directly. In temperature climates the C-13 value for soil air and recharge carbonate is approximately -2.5%. In arid and subtropical regions soil CO2 may have C-13 values in the range of -1.2% to -1.8%. Carbon-14 measurements are useful in studying groundwater flow rates and the rates of physical and chemical processes occurring in groundwater systems. In addition, they are useful to differentiate between sources of water in mixed water situations and for determining areas of recharge and discharge in otherwise unknown hydrologic systems. (Woodard-USGS)
W73-12297

FEASIBILITY STUDY OF THE EXPLOITATION OF ELECTROMAGNETIC SURFACE WAVE PROPAGATION FOR MINERAL PROSPECTING AND MAPPING THE WATER TABLE,
Nebraska Univ., Lincoln. Dept. of Electrical Engineering.
E. Baha.
Available from NTIS, Springfield, Va COM-73 10309 Price $3.00 printed copy; $1.45 microfiche. Research Series 0072-01 (final report), (1972). 23 p, 13 fig, 10 ref. NOAA E22-26-71 (G).

Descriptors: *Groundwater resources, *Mineralogy, *Mapping, *Water table, Methodology, Radio waves, Radiation, Electromagnetic waves, Geomorphology, Mathematical studies, Equations, Evaluation, Computer programs.

The feasibility of employing a radio wave method for the purpose of mapping the underground water resources and mineral prospecting was explored. A full wave solution to the problem of propagation of radio waves over nonuniform layered media was derived. In the analysis, the thickness and the electrical parameters of the overburden are assumed to be functions of distance along the path of propagation. Excitation by concentrated sources was considered; thus both plane wave and surface wave excitation are accounted for. The substratum which is assumed to be a good conducting medium is characterized by a finite surface impedance. A computer program has been written to determine the scattered field pattern for typical overburden parameters. The computation of the scattered radiation pattern due to plane wave excitation is very satisfactory, however the computations involving surface wave scattering require some additional refinements. (Woodard-USGS)
W73-12311

2G. Water in Soils

STUDIES OF SAPROLITE AND ITS RELATION TO THE MIGRATION AND OCCURRENCE OF GROUNDWATER IN CRYSTALLINE ROCKS,
Georgia Univ., Athens. Dept. of Geology.
J. H. Howard, III.
Available from the National Technical Information Service as PB-222 002, $3.00 in paper copy, $ 1.45 in microfiche. Environmental Resources Center, Georgia Institute of Technology Atlanta Report ERC-0473, June 1973, 23 p, 7 fig, 18 ref. OWRR-B-010-GA (1). 14-01-0001-1488.

Descriptors: *Hardpan, *Groundwater recharge, Saprolites, Subsoil, Rock properties, Permeability.
Identifiers: *Low-permeability zone, *Rock weathering, Georgia Piedmont.

Geochemical, mineralogical, and textural studies of weathering mantles of crystalline rocks of the Georgia Piedmont show that a low-permeability horizon, which develops during the weathering of some rock types and which impedes infiltration of water from the surface, is formed by the accumulation of kaolinite and oxides of iron, aluminum, and silicon. Three types of hardpan were found, but only one is extensive in its impedance of water infiltration. This is a dense layer, often several feet thick and composed of acculations of hematite, kaolinite, and probably silica, which forms in the weathering mantle of granitic and gneissic rocks. It may be possible to disrupt this low-permeability layer by application of organic reducing agents, thus increasing water infiltration for recharge of the underlying water table. The geologic terrane is of greatest importance in the development of the low-permeability horizons, which develop on rocks of fairly uniform structure and texture: plutonic granites and granite gneisses. Low-permeability zones do not develop on dense fine-grained rocks or metamorphic rocks with inclined foliation. Favorable well sites can be selected on the basis of a knowledge of the areal geology, so that areas with likelihood of hardpan development, and thus low water infiltration, can be avoided. (James-Georgia)
W73-11706

SOIL MOISTURE EXTRACTION AND IRRIGATION DESIGN REQUIREMENTS FOR CORN,
Nebraska Univ., Lincoln.
For primary bibliographic entry see Field 03F.
W73-11727

DAIRY WASTE PONDS EFFECTIVELY SELF-SEALING,
Agricultural Research Service, Riverside Calif. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 05B.
W73-11764

ESTIMATING WATER LOSS AND DIRECT RUNOFF FROM STORM RAINFALL BY THE USE OF THE INFILTROMETER,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02E.
W73-11823

STEADY UPWARD AND DOWNWARD FLOWS IN A CLASS OF UNSATURATED SOILS,
Wisconsin Univ., Madison.
P. A. C. Raats.
Soil Science, Vol 115, No 6, p 409-413, June 1973. 2 fig, 13 ref.

Descriptors: *Soil water movement, *Unsaturated flow, *Steady flow, Evapotranspiration, Infiltration, Capillary action, Irrigation water, Recharge, Drainage, Hydraulic conductivity.

Steady upward and downward flows of soil water may be analyzed on the basis of a three-parameter empirical relationship between the pressure head and the hydraulic conductivity. For two soils and given fluxes, pressure head profiles were calculated. For a given depth of the water table below the surface, there exists a maximum possible upward flux. Two types of downward flows are described. Either one of them may occur in the region above an interface between two different soil layers. (Knapp-USGS)
W73-11824

FIELD STUDIES ON SALT LEACHING IN A HIGHLY SALINE SODIC SOIL,
Central Soil Salinity Research Inst., Karnal (India).
I. P. Abrol, and D. R. Bhumbla.
Soil Science, Vol 115, No 6, p 429-433, June 1973. 4 fig, 5 tab, 7 ref.

Descriptors: *Leaching, *Saline soils, Water spreading, Gypsum, Land reclamation, Soil management, Permeability, Soil investigations.

The effect on leaching of salt by continuous and intermittently ponded water, with or without the application of gypsum, was studied in a highly saline sodic soil. Gypsum greatly enhanced leaching of salts, but intermittent ponding had no particular advantage over continuous ponding treatments. This is caused by the low permeability of sodic soils which results in unsaturated water movement even under continuously ponded conditions. The salts underwent considerable dispersion and were distributed in a greater soil depth. This resulted from changes in the pore size distribution and resulting velocity distribution within the water flowing through soil pores. (Knapp-USGS)
W73-11835

IONIC MIGRATION AND WEATHERING IN FROZEN ANTARCTIC SOILS,
Washington Univ., Seattle.
For primary bibliographic entry see Field 02K.
W73-11836

DEPTH INTERVALS AND TOPSOIL MOISTURE MEASUREMENT WITH THE NEUTRON DEPTH PROBE,
Royal Veterinary and Agricultural Coll., Copenhagen (Denmark).
K. J. Kristensen.
Nordic Hydrology, Vol 4, No 2, p 77-85, 1973. 3 fig, 2 tab, 12 ref.

Descriptors: *Nuclear moisture meters, *Soil moisture meters, Instrumentation, Calibrations, Moisture content, Soil water.
Identifiers: *Neutron meters.

A neutron depth probe was calibrated for soil layers of different thicknesses. For a 10-cm-thick layer of soil with the center of the instrument in the middle of the layer, about 40 to 70 percent of the response is caused by this particular layer at a water content of 8 to 40 percent by volume. For a 20-cm layer the response for similar conditions is about 65 to 85 percent. A special calibration function was calculated for the upper (0-20 cm) soil layer. The water content in this soil layer can be estimated in this way with about the same degree of accuracy as can be expected by conventional methods. (Knapp-USGS)
W73-11841

EFFECT OF EXCHANGEABLE SODIUM ON HYDRAULIC CONDUCTIVITY OF SOIL,
Uttar Pradesh Inst. of Agricultural Sciences, Kanpur (India).
V. K. Dixit, and R. N. Lal.
J Indian Soc Soil Sci. Vol 20, No 1, p 1-5, 1972.
Identifiers: *Hydraulic conductivity (Soils), *Sodium, Soils, *India, Clays.

Clay, clay loam, silty clay loam, silty loam and loam and loamy sand soils of U.P were incubated with Na2CO3 (O, 15, 25, 35, 45, 55 and 65% of CEC) in order to obtain increasing levels of exchangeable Na. An increase in exchangeable Na percentage (E.S.P.) was accompanied by a marked

decrease in hydraulic conductivity. The fractional changes in hydraulic conductivity (K/Kmax) were 0.85 at 5.01 E.S.P., 0.52 at 14.43 E.S.P., 0.21 at 24.50 E.S.P. and 0.06 at 29.88 E.S.P.--Copyright 1973, Biological Abstracts, Inc.
W73-11849

INVESTIGATION OF EFFECT OF SOIL FREEZING DEPTH AND OTHER FACTORS ON SNOWMELT RUNOFF ON RIVERS IN STEPPE AND FOREST-STEPPE ZONES (ISSLEDOVANIYE VLIYANIYA GLUBINY PROMERZANIYA POCHVY I DRUGIKH FAKTOROV NA TALYY STOK REK STEPNOY I LESOSTEPNOY ZON),
Gidrometeorologicheskii Nauchno-Issledovatelskii Tsentr, Leningrad (USSR).
For primary bibliographic entry see Field 02E.
W73-12055

SOIL WATER,

American Society of Agronomy and Soil Science Society of America: Madison, Wis., 175 p. Illus. 1972. D. R. Nielsen, editor. Pr. $8.50.
Identifiers: Books, Hydrodynamics, *Soil water, Temperature, Theoretical, *Soil properties.

Water flow in unsaturated soil is discussed. Subjects include: the solid and fluid properties of the soil-water system, theoretical analysis of soil-water potential, hydrodynamics, diffusion, dispersion and other physical properties, water movement under isothermal conditions, the effect of temperature on unsaturated soil water transport, and the isothermal flow of nonhomogeneous aqueous solutions. A variety of methods for field investigations on water flow in unsaturated soil, graphs, diagrams and tables are included.--Copyright 1972, Biological Abstracts, Inc.
W73-12171

MATRIC SUCTIONS TO WHICH SOILS IN SOUTH CENTRAL ENGLAND DRAIN,
Rothamsted Experimental Station, Harpenden (England).
R. Webster, and P. H. T. Beckett.
J Agric Sci. Vol 78, No 3, p 379-387. 1972. Illus.
Identifiers: Capacity, Drains, *England, *Matric suctions, *Soils.

In a survey of soils matric suctions were measured frequently during 1962 and 1963. Results for the period Oct.-May are given for sites lying above the influence of the regional ground water table and show the matric suctions to which the soils drain. Sandy soils drain within 2 or 3 days to a definite field capacity at about 50 mbar suction. Loams and clay loams, though from profile appearance regarded as freely drained, take up to about 1 wk to drain to fairly constant suction of 40-50 mbar, which can also be regarded as field capacity. However, suctions prevailing during this time are less - about 20 mbar. The prevailing suctions in clay soils are about 10 mbar in the topsoil (13 cm) and -10 mbar in the subsoil (38 cm). These soils drain slowly but steadily when rain ceases and no definite field capacity is evident. For sandy soils, loams and clay loams, the matric suctions characterize the upper limit of the available water capacity (AWC) of the soil. The values are less than almost all previous estimates or assumed values. For the clays the upper limit of AWC remains best estimated by field sampling at the time of interest.--Copyright 1972, Biological Abstracts, Inc.
W73-12172

SOIL CHANGES CAUSED BY EROSION CONTROL TREATMENTS ON A SALT DESERT AREA,
New Brunswick Univ., Fredericton. Dept. of Biology.
R. W. Wein, and N. E. West.
Soil Science Society of America, Proceedings, Vol. 37, No. 1. p. 98-103, January-February 1973. 2 fig., 3 tab., 26 ref.

Descriptors: *Soil investigations, *Saline soils, *Salt tolerance, *Soil water movement, *Sedimentation rates, Utah, Colorado River Basin, Furrow irrigation, Drainage engineering, Watersheds (basins), Bulk density, Desert plants, Deserts, Plant physiology, Soil types, Erosion control.
Identifiers: Upper Colorado River Basin, Salt Desert.

The Upper Colorado River Basin is comprised in part of 18 million acres of Utah's erosion-prone watershed. Although this area contributes only 5 percent of the water to the Colorado River, it contributes 44 percent of the sediment. This has resulted in inadequate drainage due to the filling of reservoirs, reducing storage capacity, and salt accumulation in the catchment basins of gully plugs and furrows. A comparison of Chipeta Series soil and an unnamed soil revealed that infiltration rates decreased in the Chipeta Series soil as clay accumulated on the gully plug floor so that during rainstorms the water supply was essentially sealed off from the subsoil, therefore evaporating into an arid environment. The salt buildup caused by slow infiltration appears to be inevitable. In the Chipeta Series soil, or in very saline soils, a salt buildup could occur before the gully plugs fill with sediment to a level where breaching occurs. The gully plug is essentially self destructive in soils of saline-sodic nature because the short term increase in vigor and density of native species is cancelled out by the loss of plants during construction and during the return to status quo. (Bahre-Arizona)
W73-12249

NUTRIENT AVAILABILITY IN DESERT GRASSLAND SOILS UNDER MESQUITE (PROSOPIS JULIFLORA) TREES AND ADJACENT OPEN AREAS,
Forest Service (USDA), Wenatchee, Wash. Forest Hydrology Lab.
For primary bibliographic entry see Field 02I.
W73-12250

THE PREDICTION OF SOIL OCCURRENCE IN CERTAIN DESERT REGIONS OF THE SOUTHWESTERN UNITED STATES,
Soil Conservation Service, University Park, N. Mex.
L. H. Gile, and J. W. Hawley.
Soil Science Society of America, Proceedings, Vol. 36, No. 1, p. 119-124, January-February 1972. 3 fig., 1 tab., 22 ref.

Descriptors: *Soil formation, *Soil investigations, *New Mexico, *Maps, Soil analysis, Terrain analysis, Topographic mapping, On-site data collections, Sierozems, *Southwest US, Climatic data, Rio Grande River, Geologic formations, Flood plains.
Identifiers: Robledo Mountains, Rio Grande flood plain.

The Robledo Mountains and Rio Grande flood plain in New Mexico provide an on-site data collection base to determine soil genesis and soil distribution of extensive areas of desert soils in the southwestern United States. Analysis in terms of terrain, parent materials, range in age of soils, and general climatic history can be accomplished with the use of airphotos and geologic, topographic, and hydrologic maps. Topographic surveys reveal the carbonate content of parent materials, and determine the direction of soil development into Argids or soils other than Argids. Precipitation and dry dustfall provide important sources of calcium to the soils, preventing the development of argillic horizons. Soils without argillic horizons can also occur in low carbonate parent materials when the argillic horizon is obliterated. Physiographic position has implications for soil age and morphology. Both flood plains and steep slopes of strongly dissected terrains tend to be dominated by Entisols. These soils have weak or no genetic horizons and occur either in materials recently deposited or in old sediments recently exhumed. This is apparently due to low tables caused by downcutting of the Rio Grande. In contrast, soils of a stepped sequence of stable surfaces have progressively older and more complex soils with increasing elevation. (Bahre-Arizona)
W73-12256

IMPACT OF WETTING ON MICROBIAL RESPIRATION IN DESERT SOIL,
Wisconsin Univ., Madison. Dept. of Soil Science.
A. N. Macgregor.
Soil Science Society of America, Proceedings, vol. 36, p. 851-853, September-October 1972. 1 fig., 7 refs.

Descriptors: *Soil investigations, *Soil properties, *Soil gases, *Deserts, *Precipitation (Atmospheric), *Arizona, Soil microbiology, Carbon dioxide, Respiration, Sierozems, Arid lands, Soil temperature, Nitrogen, Wetting.
Identifiers: Sonoran Desert, *Tucson Basin.

Sonoita sandy loam (free of plant litter) was collected from the Santa Rita Mountains in the Tucson Basin to evaluate the response of normally arid soil to moisture, and consequent participation in soil nitrogen transformations. The response was immediate with carbon dioxide, identified as a major gas component, released in amounts equivalent to 50 microliters per gram of dry soil. The changes in carbon dioxide generation and oxygen consumption provide an index of soil microbiological activity with an estimated ten-fold increase in carbon dioxide concentration following rainfall, while also temporarily increasing the photosynthetic efficiency of desert vegetation. Greatest influence on soil respiration is a 60 to 80 percent water holding capacity. Soil temperature may also affect rates of soil respiration; at high temperatures, nonbiological uptake of oxygen may be significant, but at 30 degrees C, approximately 90 percent or greater of the oxygen consumed by a soil is due to biological processes. The results of the investigation into the general physiology of indigenous microorganisms in virgin desert soil indicate that respiration may be attributed to an indigenous microflora fully adapted to an arid environment characterized by sustained dry periods, punctuated by brief wet periods. (Bahre-Arizona)
W73-12257

REACTIONS OF HERBICIDES WITH SOIL AND PLANTS,
Bayerische Landesanstalt fuer Bodenkultur, Pflanzenbau und Pflanzenschutz, Munich (West Germany).
For primary bibliographic entry see Field 05B.
W73-12266

VARIABILITY OF THE SOIL WATER FLOW PARAMETERS AND THEIR EFFECT ON THE COMPUTATION OF RAINFALL EXCESS AND RUNOFF,
Agricultural Research Service, University Park, Pa. Northwest Watershed Research Center.
A. S. Rogowski.
In: Proceedings, (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December, 11-14, 1972. p 359-377, (1972). 7 fig, 2 tab, 14 ref.

Descriptors: *Variability, *Soil water, Flow, *Parametric hydrology, *Rainfall-runoff relationships, *Hydraulic conductivity, Evapotranspiration, Infiltration, Surface runoff, Hydrologic data, *Pennsylvania.
Identifiers: Land slope, Gradient.

This study illustrates the field distributions of hydraulic conductivity, potential gradient, and soil water content and examines their influence on the distributions of water flux, infiltration, and evapotranspiration. A 100 meter long experimental area located in the Ridge and Valley region of east central Pennsylvania was utilized. It is concluded that at low water contents, variability of the gradient accounts for most of the variability in the water flux. Close to saturation, however, ten fold variation mean flux is due principally to the variations in the conductivity. On the average, soil water was being removed by evapotranspiration three times as fast as could be supplied by upward flux. If the parameters and antecedent conditions for computing the rainfall excess were estimated from the distributions of hydraulic conductivity and soil water content, the results showed that, on the average, surface runoff is unlikely except on a small portion of an area and when the profile antecedent conditions come into prominence. (See also W73-12269) (Bell-Cornell)
W73-12291

THE TRANSFORMATION OF NITROGEN AND CARBON IN THE SOIL DURING HUMIFICATION OF STRAW LABELLED WITH N15,
Wyzsza Szkola Rolnicza, Poznan (Poland). Dept. of Plant Physiology.
D. Wojcik-Wojtkowiak.
Plant Soil. Vol 36, No 2, p 261-270. 1972. Illus.
Identifiers: Ammonium carbonate, *Carbon, Fulvic-Acid, Humic-Acid, *Humification, Nitrates, *Nitrogen, Nitrogen-15, Oat-M, Sodium nitrate, Soils, *Straw Transformation.

Laboratory tests were made on the effect of NaNO3 or (NH4)2CO3 on the dynamics of humification in the soil of oat straw tagged with N15. The mixture was incubated for 112 days, at constant temperature and moisture conditions. NH4-N accelerated the straw humifications more than NO3-N. Humification started directly after the straw was introduced into the soil. N15 derived from straw constituted a part of the forming humic compounds. Already after 14 days of incubation, the N15 of straw was found in all fractions of humic compounds. Mineralization accompanied humification. The added inorganic-N accelerated not only straw humification, but also the mineralization of forming humic compounds. This is why the added inorganic-N had no influence on the content of humic compounds. The decisive factor in the increase of humic and fulvic acids in the soil, was the straw. The inorganic-N added to the straw, had no influence on the quality of humic acids formed in the soil.--Copyright 1972, Biological Abstracts, Inc.
W73-12342

2H. Lakes

SYSTEMS ANALYSIS OF THE GREAT LAKES,
Michigan Univ., Ann Arbor. School of Public Health.
For primary bibliographic entry see Field 04A.
W73-11703

POPULATION BIOLOGY OF THE HELMINTH PARASITES OF PHOXINUS PHOXINUS (L.) THE MINNOW, IN A CARDIGANSHIRE LAKE,
Tobacco Research Council, Harrogate (England). Labs.
M. C. Bibby.
J Fish Biol. Vol 4, No 2, p 289-300. 1972. Illus.
Identifiers: Biology, Brains, Cariganshire (Wales), Diplostomum-Phoxini, *Helminth parasites, Infection, Intestine, Lakes, Ligula-Intestinalis, Macrolecithus-Papilliger, *Minnow, Neoechinorhynchus-Rutili, Parasites, *Phoxinus-Phoxinus, Population, Seasonal, *Wales (Frongoch Lake).

Specimens of P. phoxinus were collected over a period of 1 yr from Sept. 1967-Sept. 1968 from Frongoch Lake, Cardiganshire, Wales. Of a total of 650 fish examined for helminth parasites, 32% were definitive hosts for Macrolecithus papilliger, and 16.5% for Neoechinorhynchus rutili (Mueller), both parasites of the alimentary canal. All the fish examined were second intermediate host for Diplostomum phoxini (Faust) in the brain and 1.67% for Ligula intestinalis (L.) in the coelom. An increase in incidence of infestation with M. papilliger in spring and autumn and with N. rutili in summer were evident. The sex of the fish had no apparent effect on worm burden whereas size was more significant. There was a decrease in incidence of infestation with M. papilliger and an increase with N. rutili together with an increase in intensity of infestation with D. phoxini as the fish became larger. The latter species accumulated in the brain as the host increased in age.--Copyright 1972, Biological Abstracts, Inc.
W73-11716

INTRODUCTION OF KOKANEE SALMON (ONCORHYNCHUSNERKA) INTO LAKE HURON,
Department of Lands and Forests, South Baymouth (Ontario). Research Branch.
For primary bibliographic entry see Field 08I.
W73-11717

CRAYFISH FARMING IN THE UNITED STATES,
Louisiana State Univ., Baton Rouge. Fisheries Div.
For primary bibliographic entry see Field 06D.
W73-11848

MODELING IN THE EASTERN DECIDUOUS FOREST BIOME,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 02E.
W73-11907

A MODEL OF SEASONAL CHANGES IN TOTAL NITROGEN CONCENTRATION IN THE LAKE WINGRA WATER COLUMN,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 08B.
W73-11911

ZOOPLANKTON COMPOSITION AND CHANGE IN AN ALPINE LAKE,
Calgary Univ. (Alberta). Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-11944

NET PLANKTON AND NANOPLANKTON PRODUCTION AND BIOMASS IN A NORTH TEMPERATE ZONE LAKE,
McGill Univ., Montreal (Quebec). Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-11951

PRESERVING THE GREAT LAKES,
Resources Development Consultants, Inc. Fort Collins, Colo.
For primary bibliographic entry see Field 05B.
W73-11955

OCCURRENCE, DISTRIBUTION AND DENSITY OF RANGIA CUNEATA IN LAKES PONTCHARTRAIN AND MAUREPAS, LOUISIANA,
Louisiana Wild Life and Fisheries Commission, New Orleans.
For primary bibliographic entry see Field 05C.
W73-11957

EFFECTS OF ARTIFICIAL AERATION ON THE CHEMISTRY AND ALGAE OF TWO MICHIGAN LAKES,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 05C.
W73-11958

A SYNOPTIC STUDY OF FOOD HABITS OF 30 FISH SPECIES FROM WESTERN LAKE SUPERIOR,
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
E. D. Anderson, and L. L. Smith, Jr.
Available from the National Technical Information Service as COM-72-11422, $3.00 in paper copy, $1.45 in microfiche. Minnesota Agricultural Experiment Station Technical Bulletin 279, 1971. 199p. 1 fig, 60 tab, 7 ref, appendix.

Descriptors: *Fish food organisms, *Food habits, *Fish, *Lake Superior, Synoptic analysis, Crustaceans, Amphipods, Copepods, Insects, Mollusks, Fish eggs, Smelts, Herrings, Great Lakes, Darters, Lake trout, Cisco, Rainbow trout, Suckers, Sculpins, Sticklebacks, Perches, Walleye, Pikes, Yellow perch, Shiners.
Identifiers: *Western Lake Superior, Mysis, Apostle Islands (Wis), Duluth (Minn), Superior (Wis), Bloaters, Kiyis, Whitefish, Burbot, Alewife, Lake chub.

Food habits of western Lake Superior fish are described, food interrelationships of species evaluated, and ecological relationships are presented to serve as a starting point for future related studies of the various species. Fish were obtained at 17 stations during 28 sampling periods from September 1965-December 1968. Identification and enumeration of species were followed by preservation for future analysis. Stomachs from 5871 fish, including 30 species collected on 84 dates, were examined. Description of food habits indicates the preferences of the various species and reveals similarities in diet for many. Data indicate that crustaceans constitute the main diet for most species, at least during some phase of their life history; it was found that various species depend primarily on specific types of crustaceans, such as Mysis, amphipods, and copepods. Certain species also tend to rely heavily on insects, fish, molluscs, and fish eggs. Introduction and subsequent increase of smelt has had definite effects on the endemic species, evidenced by predominant percentage use of most food organisms by smelt, suggesting that the increase in smelts strongly influenced the decline of lake herring in western Lake Superior through food competition. (Jones-Wisconsin)
W73-11959

MCMULLEN V. RAMSEY STOCK FARMS, INC. (LANDOWNERS RIGHT TO DRAIN BOTTOMLANDS OR NON-NAVIGABLE LAKE).
For primary bibliographic entry see Field 06E.
W73-12001

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR MOUNTAIN CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Dallas, Tex. Water Resources Div.
For primary bibliographic entry see Field 02E.
W73-12038

REVISED FOOD CONSUMPTION ESTIMATE OF A BLUEGILL SUNFISH POPULATION IN WYLAND LAKE, INDIANA, USA,
Arizona State Univ., Tempe. Dept. of Zoology.
S. D. Gerking.
J Fish Biol, Vol 4, No 2, p 301-308, 1972, Illus.
Identifiers: *Bluegill sunfish, *Indiana (Wyland Lake), Lakes, Lepomis-macrochirus, Fish population, *Fish diet.

The estimate of food consumption by the bluegill sunfish (Lepomis macrochirus) population of Wyland Lake, Indiana, was examined with reference to recent research on the length of the growing season and the effect of body weight, ration and activity on growth efficiency. Growth efficiency was measured in the laboratory in terms of protein, comparing N assimilated with N accumulated over a period of about 30 days. The revised consumption of protein was 134.9 kg (or 1407 kg live weight of aquatic organisms, 444 kg/ha) during a growing season of 111 days compared with the original estimate of 127.3 kg calculated for an assumed growing season of 150 days, a difference of only 6%. The correspondence between the 2 estimates was coincidental. The original estimate was made at a time when the growing season had not been measured and the effect of ration and body size on growth efficiency was not precisely known. Corrections for these factors plus that for activity compensated for one another, closely approaching, by chance, the original value.--Copyright 1972, Biological Abstracts, Inc.
W73-12046

CURRENTS IN THE SHORE ZONE OF A NONTIDAL SEA (TECHENIYA BEREGOVOY ZONY BESPRILIVNOGO MORYA),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
I. F. Shadrin.
Izdatel'stvo 'Nauka', Moscow, 1972. 128 p.

Descriptors: *Currents (Water), *Ocean currents, *Shores, Littoral, Littoral drift, Rip currents, Waves (Water), Energy, Water circulation, Movement, Winds, Velocity, Flow, Hydrodynamics, Mathematics, Topography, Slopes.
Identifiers: Longshore currents, Compensation currents, Countercurrents, Navier-Stokes equations.

General concepts are presented of currents in the shore zone of seas and oceans. Longshore, compensation, and wind currents are described in connection with their role in the dynamics of the shore zone of a nontidal sea, and problems relating to the velocity field of currents are discussed. (Josefson-USGS)
W73-12060

SOME KINETIC ENERGY SPECTRA IN A NEARSHORE REGION OF LAKE ONTARIO,
Ontario Ministry of the Environment, Toronto.
For primary bibliographic entry see Field 02E.
W73-12084

ECOLOGICAL STUDIES ON CRATER LAKES IN WEST CAMEROON FISHES OF BAROMBI, MBO,
British Museum of Natural History, London (England).
E. Trewavas, J. Green, and S. A. Corbet.
J Zool Proc Zool Soc Lond. Vol 167, No 1, p 41-95. 1972. Illus.
Identifiers: *West Cameroon, Crater lakes, Ecological studies, *Fishes, Genus, Konia, *Lakes, Myaka.

In the West Cameroonian crater lake, Barombi Mbo, and its inflowing stream there are 17 spp. of fishes, of which 12, including 11 cichlids, appear to be endemic. A systematic account is given of the endemics, including 4 new species and 2 new genera, KONIA and MYAKA. The ecology of the lake is described in relation to the feeding biology of the fishes, studied by underwater observation in the lake and the examination of stomach contents. The cichlids in Barombi Mbo probably evolved there from 2 or 3 ancentral populations and now show clear ecological separations in their feeding and breeding. The problem of speciation within the lake is of particular interest because of the apparent absence of physical barriers to account for the genetic isolation of incipient species.--Copyright 1972, Biological Abstracts, Inc.
W73-12168

SEASONAL PLANKTON CHANGES AND PRIMARY PRODUCTIVITY IN BEECH RESERVOIR,
Tennessee Valley Authority, Muscle Shoals, Ala.
M. P. Taylor.
J Tenn Acad Sci. Vol 47, No 3, p 103-111. 1972. Illus.
Identifiers: *Phyto-plankton, *Primary productivity, Reservoirs, Seasonal, *Tennessee (Beech Reservoir).

The Beech River drainage basin covers 302 square mi in west Tennessee and empties into Kentucky Lake at Tennessee River Mile (TRM) 136.0. Beech Reservoir, with a shoreline of 22 mi and a pool area of 347 ha is one of 8 reservoirs located in this drainage basin. In this study, phytoplankton productivity studies, phytoplankton standing crop and certain chemical analyses indicated that Beech is a more productive reservoir. Primary productivity values ranged from 85 mg C/m2/day in Feb to 5563 mg C/m2/day in Sept. The 9-mo. primary productivity mean was 1.619 mg C/m2/day. Chlorophyll a concentrations ranged from 14 mg/m2 in Aug. to 124 mg/m2 in March. Phytoplankton cell counts averaged 6,961,555/l. The major ionic change was shown when total Fe increased in the hypolimnion during April. Iron concentrations reached a maximum in Aug.--Copyright 1972, Biological Abstracts, Inc.
W73-12169

AN EVALUATION OF SELECTED MARKS AND TAGS FOR MARKING RECENTLY METAMORPHOSED SEA LAMPREYS,
Bur. Sport Fish. Wild., Hammond Bay Biol. Stn., Millersburg, Mich. Bureau of Sport Fisheries and Wildlife, Millersburg, Mich. Hammond Bay Biological Station.
L. H. Hanson.
Prog Fish-Cult. Vol. 34, No. 2, p 70-75. 1972 Illus.

Descriptors: *Dyes, gels-solvent, Lampreys, *Marking, Population dynamics, Tagging, *Sea lampreys (Metamorphosed), *Great Lakes.

A sutable method for marking recently metamorphosed sea lampreys is essential for understanding the population dynamics and determining the length of parasitic life, growth rates, and migratory patterns of adult sea lampreys in the Great Lakes. Such a mark should not encumber the lamprey, but must persist and be easily recognizable on fullgrown, sexually mature adults. Polyvinyl chloride loop tags, disc tags, thermal branding, fin cutting microtags, and the injection of various dye-gel and dye-solvent combinations were all tested and evaluated as potential marking techniques. It was determined that a fin-injection technique, using certain dye-gel or dye-solvent combinations, was an excellent method for marking sea lampreys. All other methods evaluated were unsatisfactory.--Copyright (c) 1972, Biological Abstracts, Inc.
W73-12251

GREAT LAKES WATER LEVELS, 1970, DAILY AND MONTHLY AVERAGE WATER SURFACE ELEVATIONS.
National Ocean Survey, Detroit, Mich. Lake Survey Center.
For primary bibliographic entry see Field 07C.
W73-12298

REMOTE SENSING STUDY OF THERMAL DISCHARGES TO LAKE MICHIGAN, WISCONSIN, ILLIONOIS, INDIANA, AND MICHIGAN.
National Field Investigations Center-Denver, Colo.
For primary bibliographic entry see Field 05B.
W73-12309

STATE UNIVERSITY OF NEW YORK, COLLEGE AT PLATTSBURGH, LAKES AND RIVERS RESEARCH LABORATORY 1972 TECHNICAL REPORT.
For primary bibliographic entry see Field 05B.
W73-12321

TOXICITY OF LEAD NITRATE TO FIVE SPECIES OF FRESHWATER ALGAE,
State Univ. Coll., Plattsburgh, N.Y. Miner Inst. of Man and His Environment.
For primary bibliographic entry see Field 05C.
W73-12322

STUDIES ON THE SEASONAL AND SPATIAL DISTRIBUTION OF PHOSPHATES, NITRATES, AND SILICATES IN LAKE CHAMPLAIN,
State Univ. Coll., Plattsburgh, N.Y. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05B.
W73-12323

ORTHOPHOSPHATE CONCENTRATIONS AND DISTRIBUTIONS IN NORTHWEST BAY: 1971-1972,
For primary bibliographic entry see Field 05B.
W73-12324

MODULES FOR INTEGRATED AQUATIC MODELING,
For primary bibliographic entry see Field 05B.
W73-12325

A GENERAL MODEL FOR VERTICAL THERMAL STRATIFICATION IN ICE FREE LAKES,
State Univ. Coll., Plattsburgh, N.Y.
G. E. Myer.
In: State University of New York Lakes and Rivers Laboratory 1972, Technical Report, p 81-179, February 1973. 11 fig, 1 tab, 16 ref, 4 append.

Descriptors: *Mathematical models, *Lakes, *Simulation analysis, Computer programs, Model studies, Limnology, Heat flow, Stratification, Thermal stratification, Thermocline, *New York.
Identifiers: *Lake Champlain.

A general model was developed to simulate the vertical thermal development of most mid-latitude lakes during their ice free period. The model is based on the heat balance of lakes, including solar radiation, longwave radiation, latent heat exchange, sensible heat exchange, heat exchange with rivers, and heat exchange at the bottom of the lake. Vertical mixing is modeled in three ways to simulate mixing primarily caused by density instabilities, wind stress on the surface, and eddy diffusion. The model is written in the form of a FORTRAN computer program. The model was tested by simulating the thermal development of three lakes ranging in size from Lake Champlain, to Lower Chateaugay Lake, New York, which is only a few kilometers long. (See also W73-12321) (Knapp-USGS)
W73-12326

HYPSOMETRY OF LOWER CHATEAUGAY LAKE AND A POND ON THE SARANAC RIVER,
D. Hulbert, and G. Myer.
In: State University of New York Lakes and Rivers Research Laboratory 1972, Technical Report, p 180-186, February 1973. 4 fig, 2 tab.

Descriptors: *Hypsometric analysis, *Lake morphometry, *Bathymetry, *Mapping, Limnology, *New York.
Identifiers: *Chateaugay Lake (NY).

Lower Chateaugay Lake is a small lake about 3 km long 1309 ft above sea level in the Adirondack Mountains in New York State. The lake is relatively flat bottomed with relatively steeply sloped sides along the easterly and westerly shores. The northern and southern ends of the lake are comparatively shallow and show evidence of deposition of sediments. Rooted aquatic plants are numerous in these shallow regions. A hypsometry curve and a hypsometric map are presented. A small pond on the Saranac River is about 1 km long and is located near Plattsburgh, N.Y. This pond was formed by the flooding of a region on either side of the Saranac River behind a small dam owned by Georgia Pacific Paper Company and used for the generation of electric power. The river's channel through the pond can be seen easily in the hypsometric map. (See also W73-12321) (Knapp-USGS)
W73-12327

HYPSOMETRIC MAP OF HARRIS LAKE, NEW YORK,
State Univ. Coll., Plattsburgh, N.Y.
G. Myer, and A. Scarpinato.
In: State University of New York Lakes and Rivers Research Laboratory 1972, Technical Report, p 187-190, February 1973. 2 fig, 1 tab.

Descriptors: *Hypsometric analysis, *Lake morphometry, *Bathymetry, *Mapping, Limnology, *New York.
Identifiers: *Harris Lake (NY).

Harris Lake is a small elongate lake about 3 kilometers long located in the Adirondack Mountains of New York State. The shoreline of the lake is quite irregular and the main portion of the lake consists of two elongate basins which lay along a generally east-west line. A third smaller basin is connected to the south side of the lake. The hypsometric curve and a hypsometric map for the lake are presented. (See also W73-12321) (Knapp-USGS)
W73-12328

DISSOLVED ORGANIC MATTER IN NATURAL WATERS: A SELECTED BIBLIOGRAPHY, WITH EMPHASIS ON ANALYTICAL METHODS,
State Univ. Coll., Plattsburgh, N.Y. Dept. of Chemistry.
K. W. Loach.
In: State University of New York Lakes and Rivers Research Laboratory 1972, Technical Report, p 191-205, February 1973. 177 ref.

Descriptors: *Organic matter, *Bibliographies, Limnology, Ecology, Water pollution, Nutrients, Lakes, Trace elements, Surfactants.

This bibliography is a selection of references of interest to anyone wishing to do experimental work on the chemistry of dissolved organic matter (DOM). The references are classified under the following headings: occurrence of DOM in natural waters, conversions and interactions of DOM, surface-active effects of DOM, and interactions of DOM with trace metals. (See also W73-12321) (Knapp-USGS)
W73-12329

DIVERSITY AND ABUNDANCE OF AQUATIC INSECTS REDUCED BY INTRODUCTION OF THE FISH CLARIAS GARIEPINUS TO POOLS IN CENTRAL AFRICA,
Leicester Univ. (England). Dept. of Zoology.
J. S. Weir.
Biol Conserv, Vol 4, No 3, p 169-176, 1972.
Identifiers: Abundance, *Africa (Central), Aquatic insects, *Clarias-gariepinus, *Coleoptera, Diversity, Fish, *Hemiptera, Insects, Pools.

Dry-season collections of aquatic insects from two similar adjacent man-made pools in Rhodesia, one with and one without the omnivorous fish Clarias gariepinus, revealed large differences in numbers and species. Adult Hemiptera and Coleoptera (which breed during the wet season in numerous shallow ephemeral seasonal pools) dominated the fauna in both cases. Collections showed a reduction under predation from 2196 Hemiptera (15 spp.) to 51 (5 spp.), and from 1070 Coleoptera (31 spp.) to 15 (7 spp.). Predation is selective, certain common species becoming rare, and less common species disappearing. Other man-made pools showed similar differences. These insects normally spend the dry season concentrated in the few permanent pools which exist in river beds or in occasional permanent lakes, where there are structural refugia such as stones and reed-beds. The pools described here are structurally undifferentiated. Plant growth is suppressed, following heavy usage by mammal populations. Such pools with fish are false refugia. The creation of such pools or farm dams containing fish may have far-reaching effects on the aquatic fauna of other habitats. Fish productivity in pools might be increased by the presence of occasional pools without fish.--Copyright 1972, Biological Abstracts, Inc.
W73-12339

ON THE WATER QUALITY OF LAKE BIWA--KO AND THE INHABITABILITY OF THE BIVALVE, CORBICULA SANDAI, IN THE SETA RIVER, (IN JAPANESE),
Shiga Univ., Otsu (Japan). Faculty of Education.
For primary bibliographic entry see Field 05C.
W73-12344

THE LITTORAL FAUNA OF LLYN CELYN, NORTH WALES,
Liverpool Univ. (England). Dept. of Zoology.
P. C. Hunt, and J. W. Jones.
J Fish Biol. Vol 4, No 2, p 321-331. 1972. Illus.
Identifiers: Chironomidae, Fauna, *Littoral fauna, Lumbriculidae, North, Pisidium, Trout, *Wales (Llyn-Celyn), Reservoirs.

Water level fluctuations of up to 5.5 m in the newly constructed reservoir, Llyn Celyn, were shown to result in a uniformly barren littoral zone in which Lumbriculidae, Pisidium sp. and Chironomidae were the only animals to occur in significant numbers throughout the year. Other groups of animals were unable to survive the big fluctuations in water level and this in turn affected the food and growth of trout in the environment.--Copyright 1972, Biological Abstracts, Inc.
W73-12345

2I. Water in Plants

FOREST SOILS AND THE ASSOCIATED SOIL--PLANT WATER REGIME,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
J. L. Smith.
In: Proceedings of the Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec. 13-17, 1971, Vienna. (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 399-412. 4 tab, 19 ref.

Descriptors: *Soil water movement, *Soil-water-plant relationships, *Tracers, *Tritium, Phosphorus, radioisotopes, Forest soils, Coniferous forests, Snow management, Radioecology.

Coefficients for water-balance formulas based on the energy-balance approach can be estimated by using data on water movement determined by isotope tracers. Water movement through a pyroclastic soil of 41-66% porosity (12.2-30.5 cm/hr, the rate depending on the depth of the water table) was traced by tritium and P32. Water movement in red fir and lodgepole pine trees (0.3-1.3 cm/hr in winter; 1.5-2 m/hr in early spring when the soil was covered by snow) was traced by P32. Total water use by lodgepole pine (0.1 liter/hr for long-term movement in winter; 30.6 liters/hr for short-term movement in early spring) was estimated by combining rates and area of water movement within trees. (See also W72-10679) (Bopp-ORNL)
W73-11933

DISTRIBUTION AND AGE OF MARGARITIFERA MARGARITIFERA (L) IN A MADISON RIVER (MONTANA, USA) MUSSLE BED,
Washington Univ., Seattle. Fisheries Research Inst.
Q. J. Stober.
Malacologia. Vol 11, No 2, p 343-350, 1972. Illus.
Identifiers: Age, Distribution, Growth, Ligament, Margaritifera-Margaritifera, *Montana (Madison River), *Mussel beds, Rivers.

The distribution of M. margaritifera (L.) in a Madison River mussel bed 26 x 130 m was investigated during the winter of 1968. Mussels were concentrated in small scoured depressions and were not randomly distributed. They preferred stony bottom areas with sufficient water velocity to prevent deposition of sand, silt and detritus. The annuli in the ligaments of 4 relatively young mussels (ages 10, 11, 16 and 16 years) were measured and averaged to obtain a ligament growth curve for the Madison River population. Ages for 84 mussels were determined on the basis of this curve. The minimum and maximum ages were 10 and 67 years respectively, with an average of 47.9 years. Of 171 mussels examined, total length measurements of 86.5% were between 80 and 95 mm. The slope (0.745) of the regression of shell weight versus age was considered to reflect the average annual weight increase. A comparison of growth curves for the Madison River, Arctic, and Southern Sweden indicated that Madison River mussels grew at a faster rate than those collected in Sweden.--Copyright 1973, Biological Abstracts, Inc.
W73-12159

OBSERVATION ON THE SIMULATED EFFECTS OF RAIN ON LARVA OF NEODIPRION SWAINEI (HYMENOPTERA, DIPRIONIDAE),
British Columbia Univ., Vancouver. Dept. of Plant Science.
B. J. R. Philogene.
Can Entomol. Vol 104, No 6, p 895-596, 1972.
Identifiers: Diprionidae, Hymenoptera, Larva, *Neodiprion-Swainei, Pinus-Banksiana, *Rain, *Simulation.

Prolonged rainfall was simulated in the laboratory to evaluate the effect of precipitation on the mortality rate and larval development of N. swainei through maturity. A test group of larvae were subjected to 20 sec of sprinkling 5 times in the morning and 5 times in the afternoon until eonymph formation (temperature of 22C), 14 hr of light/day; control groups were raised under identical conditions without watering. Intermittent watering was harmful to development: the test larvae took more time to reach the eonymphal state and died in larger numbers than the controls. This higher mortality was above all an effect of the impact of water on the individuals. The larvae that died were dislodged from Pinus banksiana Lamb. branches on which they were raised (after the third larval stage) by water droplets and once they were on the ground they were exposed to more water than the larvae left attached to the pine needles. They appeared incapable of climbing back and died of inanition. Post-eonymphal development and female fecundity of individuals exposed to watering but

that were not dislodged did not significantly differ from that of eonymphs developing from watered larvae. In fact, watered individuals of one of the larval collection sites presented higher fecundity. The observations reported indicated the reduction of this pest during abundant and continuous rains. Even higher reduction could occur with temperatures lower than 22C during periods of larval development and female fecundity since temperature and humidity generally work together.--Copyright 1973, Biological Abstracts, Inc.
W73-12160

STUDIES OF THE SPRAY ZONE OF CHURCHILL FALLS, LABRADOR,
Memorial Univ. of Newfoundland, St. John's. Dept. of Biology.
G. R. Brassard, S. Frost, M. Laird, O. A. Olsen, and D. H. Steele.
Biol Conserv Vol 4, No 1, p 13-18. 1971. Illus.
Identifiers: *Bryophytes, Canada, *Labrador (Churchill Falls), Parasites, Pathogens (Black fly), *Spray Zones (Falls).

In 1970, with the cooperation of the Churchill Falls (Labrador) Corporation Limited, an intensive biological research program was started in the Churchill Falls area. The initial objective is to study the spray zone of the Falls before it is altered by the diversion of the Churchill River. Spray from the Falls is apparently responsible for the maintenance of 3 spray pools and for the enriched flora and vegetation in the spray zone, which contains an abundance of moisture-loving plants. The vegetation shows abrupt changes with exposure to spray and there is a general retardation of the phenology. The forest in the spray zone is luxuriant in comparison with that outside the spray's influence. Bryophytes are the dominant cryptogams of the zone and have a high percentage fertility there. Permanent quadrats have been set up to monitor succession in typical sprayzone bryophyte communities. Work was also begun on blackfly pathogens and parasites. An intensified research program is being continued on the spray zone and surrounding area by Memorial University through 1971 and hopefully in subsequent years.--Copyright 1972, Biological Abstracts, Inc.
W73-12162

SOIL PHYSICAL CONDITIONS AFFECTING SEEDLING ROOT GROWTH: II. MECHANICAL IMPEDANCE, AERATION AND MOISTURE AVAILABILITY AS INFLUENCED BY GRAIN-SIZE DISTRIBUTION AND MOISTURE CONTENT IN SILICA SANDS,
Macdonald Coll., Ste. Anne de Bellevue (Quebec). Dept. of Soil Science.
B. C. Warnaars, and B. W. Favis.
Plant Soil. Vol 36, No 3, p 623-634. 1972. Illus.
Identifiers: *Aeration, Availability, Corn-M, Distribution, Grain, Grass-M, Impedance (Mechanical), *Moisture, Pea-D, *Root growth, Sands, Seedling, Silica, *Soil physical properties.

Pea, corn, and grass seedling root growth in 5 sands varying in grain-size distribution, packed dry and then maintained at 6 matric potentials, varied according to mechanical impedance and aeration. Mechanical impedance restricted root elongation in every treatment including the finer dryer sands in which longest roots were found, but it was greatest in the coarse sands, where crooked swollen roots similar in shape to the pore channels were produced. Straight evenly tapered roots were formed in the fine sands due to a more balanced stress distribution over the root tip. Interpretations of penetrometer measurements differed in coarse and fine sands. 'Aeration effects' were distinguished from mechanical impedance effects by comparing the root lengths expected (mechanical impedance acting singly) with those actually obtained (mechanical impedance and aeration acting together), and they occurred in sands with less than 25% gas-filled pore space. No effect due to water availability could be found.--Copyright 1972, Biological Abstracts, Inc.
W73-12163

ALKALI BULRUSH SEED GERMINATION AND CULTURE,
Bureau of Sport Fisheries and Wildlife, Tulelake, Calif.
E. J. O'Neill.
J Wildl Manage. Vol 36, No 2, p 649-652. 1972. Illus.
Identifiers: *Alkali bulrush-M, *California (Tulelake), Cultures, Dormancy, *Germination (Seed), Plastic sheeting, Scirpus-Paludosus-M, Seeds, Shorelines, Sodium hypochlorite.

Several hundred acres of alkali bulrush (Scirpus paludosus) were successfully seeded and propagated near Tulelake, California, after a technique was developed for breaking the seed dormancy, employing use of sodium hypochlorite, water, transparent plastic sheeting, and direct sunshine for several days. The pregermination process presents a method that can be accommodate large amounts of seed for bulk aerial or broad-casting seeding in situations similar to shallow, flooded rice fields or wet shoreline units.--Copyright 1972, Biological Abstracts, Inc.
W73-12165

A SEASONAL STUDY OF THE VEGETATION ON LEVEES,
Louisiana State Univ., New Orleans. Dept. of Biological Sciences.
G. N. Montz.
Castanea. Vol 37, No 2, p 140-146. 1972.
Identifiers: Levees, Mississippi River, *Seasonal, Species, *Vegetation, *Louisiana.

The frequency and perdentage composition of plants were determined on levees in East St. Charles Parish (County), Louisiana. This parish is west of New Orleans and is bounded on the south by the Mississippi River and on the north by Lake Pontchartrain. The vegetation was sampled by 55 line transects at the same locations in Feb-March, May-June and Aug-Sept. Eighty-nine species were recorded. Field notes indicate vernal, estival and autumnal flowering periods in the area. Eleven species were noted to flower only in the Feb-March study, 6 species only in the May-June study and 8 species only in the Aug-Sept study.--Copyright 1972, Biological Abstracts, Inc.
W73-12166

FISH SPECIES DIVERSITY IN RELATION TO STREAM ORDER AND PHYSICOCHEMICAL CONDITIONS IN THE PLUM CREEK DRAINAGE BASIN,
Southwest Texas State Univ., San Marcos. Aquatic Station.
B. G. Whiteside, and R. M. McNatt.
Am Midland Nat. Vol 88, No 1, p 90-101. 1972.
Identifiers: *Drainage basins, *Fish species, Physicochemical, Plum Creek (Tex), Species diversity, Streams, *Texas.

Water and fish samples were collected at 202 sampling stations throughout the Plum Creek drainage basin in south central Texas between Jan. and April 1968. Fish species diversity (D) was analyzed to determine its relationship to stream order and physicochemical conditions. Fluctuations in physicochemical conditions decreased as stream order increased. Twenty-seven spp. of fishes were collected. Minimum, maximum and mean numbers of species per stream increased as stream order increased through the first 4 stream orders and decreased in the 5th-order stream. Mean D values decreased from first-order to second-order streams, then increased through 4th-order streams; and decreased again in the 5th-order stream. Cumulative D values increased through 3rd-order streams and decreased in 4th-and 5th-order streams. In general, D values for adventitious streams correlated with trends in D values for the higher order stream into which the adventitious stream flowed. The decrease in number of species and in species diversity in the 5th-order stream may have been due to migration of fishes into lower order streams for spawning purposes and/or to escape abnormally high water in the 5th-order stream. Also, increased depth and obstacles, such s logs and barbed wire, may have reduced seining efficiency in the 5th-order stream.--Copyright 1972, Biological Abstracts, Inc.
W73-12167

BUTOMUS UMBELLATUS IN THE MISSISSIPPI WATERSHED,
Ohio State Univ., Columbus. Dept. of Botany.
M. L. Roberts.
Castanea. Vol 37, No 2, p 83-85. 1972.
Identifiers: *Butomus-Umbellatus-M, Missippissi watershed, *Ohio, Rivers, Survey, Watersheds, *Scioto River (Ohio).

B. umbellatus L. is reported from the Olentangy and Scioto Rivers in central Ohio. Results of a river survey indicate it will probably spread downstream in the Scioto River and into the other parts of the Mississippi watershed.--Copyright 1972, Biological Abstracts, Inc.
W73-12176

MORPHOLOGY, LIFE HISTORY, AND ECOLOGY OF AN UNUSUAL STICKLEBACK (GASTEROSTEUS ACULEATUS) IN THE QUEEN CHARLOTTE ISLANDS, CANADA,
Winnipeg Univ., Manitoba. Dept. of Biology.
G. E. E. Moodie.
Can J Zool. Vol 50, No 6, p 721-732. 1972. Illus.
Identifiers: Breeding, *Canada (Queen Charlotte Island), Ecology, Gasterosteus-Aculeatus, Islands, Life history, Morphology, Phenotypes, *Stickleback.

In Mayer Lake Black sticklebacks shared an exposed environment with several predatory fish, whereas leiurus, the typical freshwater form of G. aculeatus, was the only fish inhabiting the vegetation-choked margins of the inlet streams and stream mouths. Black sticklebacks and, to a lesser extent, leiurus were seldom collected outside their respective habitats. Breeding Black males were probably at least 2 yr old. They preferred to nest near vegetation, on sandy, gently sloping substrates. The length of the breeding season and the number of breeding cycles in the season were similar to those of other populations. Males of different phenotypes appeared to nest in habitats differing in water depth and proximity to shelter. Some difference in habitat of the nest site were seemingly correlated with breeding success. Black sticklebacks are distinguished from leiurus by their large size and pelvic spines; high gill raker, vertebral and lateral plate counts; streamlined shape; melanism and drab breeding colors. Black sticklebacks probably meet the requirements of a biologically defined species.--Copyright 1972, Biological Abstracts, Inc.
W73-12177

PREDATION, NATURAL SELECTION AND ADAPTATION IN AN UNUSUAL THREESPINE STICKLEBACK,
Winnipeg Univ., Manitoba. Dept. of Biology.
G. E. E. Moodie.
Heredity. Vol 28, No 2, p 155-167. 1972. Illus.
Identifiers: Adaptation, Gasterosteus-Aculeatus, *Natural selection, *Predation, *Stickleback (Threespine), Trout, Canada.

In Mayer Lake Gasterosteus aculeatus exists as 2 forms or 'races.' The Black form is subject to predation by 3 species. The leiurus form, restricted to the inlet streams and stream margins, has no known predators. Predator choice tests sug-

gested that Black males which develop red throats are more liable to predation than males without red throats. Black females taken from trout stomachs had significantly shorter spines than females netted in the lake. Significantly more fish with 8 lateral plates were eaten by trout than was expected on the basis of their frequency in the population. The large size of Black sticklebacks may provide various defenses against predators.--Copyright 1972, Biological Abstracts, Inc.
W73-12178

AN ANALYSIS OF MORPHOLOGICAL VARIATION: A COMPARISON OF SOME STREAM-DWELLING FISHES,
Illinois Univ., Champaign. Dept. of Zoology.
R. J. Lederer, and L. Verner.
Trans Ill State Acad Sci. Vol 65, No 1/2, p 26-32. 1972.
Identifiers: *Fishes (Teleost), *Morphological studies, Niches, Streams.

Nine spp. of (teleost) fish from 2 different streams are compared with respect to variation of some non-meristic characters. It appears that pelagic species are more variable than benthic ones and that differences in morphological variation may reflect niche size differences.--Copyright 1972, Biological Abstracts, Inc.
W73-12179

INTERSPECIFIC INTERACTIONS AND LIMITING FACTORS OF ABUNDANCE AND DISTRIBUTION IN THE RED RIVER PUPFISH, CYPRINODON RUBROFLUVIATILIS,
Oklahoma Univ., Willis. Biological Station.
A. A. Echelle, A. F. Echelle, and L. G. Hill.
Am Midland Nat. Vol 88, No 1, p 109-130. 1972. Illus.

Descriptors: *Abundance (Pupfish), Cyprinodon-rubrofluviatilis, *Distribution (Pupfish), Fundulus-zebrinus, Gambusia-affinis, Hybognathus-placitus, Lepomis-spp, Notropis-bairdi, Notropis-lutrensis, Pimephales-spp, *Pupfish (Red River).

C. rubrofluviatilis, was positively associated in occurrence with Fundulus zebrinus, Hybognathus placitus and Notropis bairdi and negatively associated with a large, predominantly freshwater (salinity < 10 ppt) complex composed of Notropis lutrensis, Gambusia affinis, Lepomis spp. and Pimephales ssp. Although occurring in dilute waters, the pupfish was virtually restricted to saline conditions (salinity>10 ppt) where few other species occurred. An apparent lack of intrinsic limiting factors was demonstrated. The pupfish seems adapted to a broad ecological niche, creating competition with an array of freshwater forms that are better adapted to exist in richer faunas. A W to E filter-bridge based on decreasing numbers of saline streams seems to be the major factor limiting eastward distribution of the pupfish. Competition and direct behavioral interaction with the pupfish seemed to be major factors depressing F. zebrinus populations in saline waters. A variety of broad adaptations of the pupfish may help to confer a numbers advantage over F. zebrinus, magnifying the effects of behavioral interaction. These effects may also help make the pupfish successful at moderate salinities (10-20 ppt) where there are at least 12 potentially competing species.--Copyright 1972, Biological Abstracts, Inc.
W73-12181

FOOD, FEEDING SELECTIVITY AND ECOLOGICAL EFFICIENCIES OF FUNDULUS NOTATUS (CYPRINODONTIDAE),
Environmental Control Corp., Painesville, Ohio.
G. L. Atmar, and K. W. Stewart.
Am Midland Nat. Vol 88, No 1, p 76-89. 1972. Illus.
Identifiers: Aquatic algae, Arthropods, Chironomid, Crustaceans, *Cyprinodontidae, Ecological efficiencies, *Feeding selectivity, *Food, Fundulus-Notatus, Insects, Snails.

Terrestrial arthropods formed 41% of the diet of field-collected black-stripe top minnow, with a consistent Electivity Index (E) value of positive-one; snails, aquatic insects and microcrustaceans, respectively, occupied 19%, 16% and 10% of the diet. Positive E values were maintained for aquatic insects except in stagnant pools where interspecific fish competition probably occurred. Crustaceans assumed negative E values except in a single habitat, while snails took positive E values only in stagnant pools. Top minnows smaller than 38 mm, S.L. (standard length), supplemented terrestrial arthropods with microcrustaceans for 28% of their ration; crustaceans decreased and aquatic insects increased in relative importance as fish size increased. Algae were ingested with 41% frequency, but apparently not digested. Fishes in feeding experiments showed a preference for chironomid larvae but an electivity for floating, terrestrial insects, which were readily available. Physid snails, with 42% frequency of occurrence in field-collected fishes, were avoided in the presence of abundant alternative prey. Assimilation efficiency was 97% for all size classes of top minnows. Two minnows of 48 to 65 mm S.L. had a lower ecological growth efficiency (5.9%) than smaller fishes (8.5%). The average daily energy expenditure for 48 to 65 mm fishes was lower, 20 cal x g of initial dry wt-1 (gWo-1), than the 55 cal x gWo-1 for fishes smaller than 48 mm, S.L.: but the net efficiency of food utilization for growth in the latter (21.6%) was not significantly higher than that in 48 to 65 mm fishes (15.0%). F. notatus facilitates the entrance of allochthonous organic material into the ecosystem by digesting and defecating the remains of terrestrial arthropods, and it indirectly taps the flow of matter and energy from allochthonous plant sources by preying upon aquatic insect detritus-feeders, getting more than one-half of its ration directly or indirectly from basically allochthonous sources. It also functions as a 3rd- or 4th-level predator.--Copyright 1972, Biological Abstracts, Inc.
W73-12184

HABITAT SELECTION AND SPATIAL INTERACTION BY JUVENILE CHINOOK SALMON AND STEELHEAD TROUT IN TWO IDAHO STREAMS,
Oregon State Game Commission, Corvallis; and Oregon State Univ., Corvallis.
F. H. Everest.
J Fish Res Board Can. Vol 29, No 1, p 91-100. 1972 Illus.
Identifiers: Allopatry, *Chinook salmon, *Idaho, Juveniles, Oncorhynchus-Tshawytscha, Salmo-Gairdneri, Salmon, *Steelhead trout, Streams, Sympatry, Trout, Fish habitats.

During summer sympatric steelhead trout (Salmo gairdneri) and summer chinook salmon (Oncorhynchus tshawytscha) segregated in Crooked Fork and Johnson creeks. In short-term allopatry, each species occupied the same types of habitat as in sympatry. Most age 0 steelhead lived over rubble substrate in water velocities and depths of less than 0.15 m/sec and 0.15, respectively; most age 0 chinook lived over silt substrate in water velocities of less than 0.15 m/sec and depths of 0.15-0.3 m/sec (near bottom) and 0.75-0.9 m/sec (near surface), and in depths of 0.6-0.75 m. As fish of each species became larger they moved into faster, deeper water. Juvenile chinook and steelhead of the same size used the same physical space. But steelhead spawn in spring and chinook spawn in early fall, and disparate times of spawning create discrete intra- and inter-specific size groups of pre-smolts. The size differences minimize potential for social inter-action, both intra- and inter-specific. Copyright (c) 1972, Biological Abstracts, Inc.
W73-12245

PATTERNS OF WATER MOVEMENT IN TREES AND SHRUBS,
Tel Aviv Univ. (Israel). Dept. of Botany.
Y. Waisel, N. Liphschitz, and Z. Kuller.
Ecology, Vol. 53, No. 3, p. 520-523, Late Spring 1972. 8 fig., 1 tab., 23 ref.

Descriptors: *Plant physiology, *Desert plants, *Stemflow, Systematics, Arid climates, Semiarid climates, Shrubs, Water storage, Xylem, Dye dispersion, Sites, On-site data collections.

Paths of water flow were examined in chamaephytes and phanerophytes, either of Mediterranean or desert chorotype, with injected dyes. All shrubs possessed the same sectoral pattern of dye ascent, but two shrubs of Chenopodiaceae family also exhibited an interlocked system. This pattern seems to be characteristic of the family and independent of the plants' ecological group. The interlocked system is common in trees from drier sites. A three year investigation found sectoral ascent of water in all aged shrubs, wheras young shrubs exhibited a sectorial turning into a ring ascent. Patterns of water movement differed in the various tree species, with large and tall crown species showing either a spiral pattern or a sectorial straight pattern turning into a ring pattern of ascent, while other species exhibited a sectorial straight pattern. The ascent pattern did not differ in two groups of Populus euphratica trees, although the location site of one was wet, while the other occurred on a dry and saline site. Differences in patterns of water movement were correlated either with differences in xylem structure, or with various ecological conditions prevailing in the habitat, indicating a pattern valuable under dry conditions. The appearance of a sectorial pattern in shrubs and tree-like shrubs suggests a survival value during water shortage. Knowledge of water movements in stems may also provide a useful distinctive criterion towards the differentiation between the two main life forms of woody plants. (Bahre-Arizona)
W73-12246

DROUGHT EFFECTS ON A SEMIDESERT GRASSLAND RANGE,
Agricultural Research Service, Las Cruces, N. Mex. Plant Science Research Div.
C. H. Herbel, F. N. Ares, and R. A. Wright.
Ecology, Vol. 53, No. 6, p. 1084-1093, Autumn 1972. 2 fig., 2 tab., 25 ref.

Descriptors: *Plant growth, *Succession, *Drought resistance, *Grasslands, *New Mexico, On-site data collections, Soil water movement, Mesquite, Effective precipitation, Soil types, Caliche, Droughts, Invasion, Climatic data.

A vegetational survey conducted on the Jornada Experimental Range in southern New Mexico indicated that drought occurrence is more frequent in areas that have minimal, rather than optimal, precipitation and may lead to severe reductions in plant yields in the areas of minimal precipitation. Data taken annually from 1941 through 1957 provided the basis for a study of the effects of the great drought of 1951 through 1956. Observation of cover and yields, based on a consideration of landform and soil characteristics, indicates a successional change of cover as drought modifies growth patterns. Drought damage was much more severe on the deep sands where the impermeable caliche layer occurred at greater depths, whereas moisture relations were better in shallow sands. Thinned grasslands were invaded by Prosopis juliflora; however, grass losses were held to a minimum with winter-spring and summer precipitation. Tabulated data indicate that annual and seasonal (July-December) precipitation for the 1951-56 period was about 55 percent of the 1941-1950 averages with the most severe drought years being 1951, 1953, and 1956. (Bahre-Arizona)
W73-12247

NUTRIENT AVAILABILITY IN DESERT GRASSLAND SOILS UNDER MESQUITE

(PROSOPIS JULIFLORA) TREES AND ADJACENT OPEN AREAS,
Forest Service (USDA), Wenatchee, Wash. Forest Hydrology Lab.
A. R. Tiedemann, and J. O. Klemmedson.
Soil Science Society of America, Proceedings, Vol. 37, No. 1, p. 107-111, January-February 1973. 1 fig., 2 tab., 22 ref.

Descriptors: *Soil investigations, *Microenvironment, *Grasslands, *Plant growth, *Arizona, Forage grasses, Moisture uptake, Germination, Grasses, Vegetation establishment, Desert plants, Mesquite, Nutrient requirements, Indicators, Plant physiology, On-site investigations, Nitrogen, Phosphorus, Potassium, Sulfur.

A pot-culture technique was used to evaluate the supply of available soil nutrients, using as indicator plants, three native perennial grasses which are most abundant under mesquite (Prosopis juliflora (Swartz.)DC) trees: Arizona cottontop (Trichachne californica (Benth.)Chase), plains bristlegrass (Seteria macrostachya H.B.K.), and bush muhly (Muhlenbergia porteri (Scribn.)). The availability of soil nutrients and the measurement of relative yields of grasses were compared with the availability of nitrogen, phosphorus, potassium, and sulfur, in soil under mesquite trees and adjacent open areas on a desert grassland site. Results minimize the effect of moisture competition between mesquite trees and perennial grasses in explaining meager growth of forage in open areas between mesquite. A low supply of soil nutrients in soil beyond the mesquite trees limits forage production, and indicates that even with check treatment and adequate moisture, the stunted chlorotic appearance of Arizona cottontop and plains bristlegrass, plants would not change. Germination of these seeds in open areas between mesquite trees would be difficult, and moisture stress conditions in desert grassland would probably further restrict establishment. Germination of seed in mesquite soil would mean a much better chance of becoming established because of a more favorable nutrient regime. (Bahre-Arizona)
W73-12250

WATER-STRESS PATTERNS IN HONEY MESQUITE,
Texas A and M Univ., College Station. Dept. of Range Science.
R. H. Haas, and J. D. Dodd.
Ecology, Vol. 53, No. 4, p. 674-680, Summer 1972. 6 fig., 3 tab., 21 ref.

Descriptors: *Mesquite, *Soil water, *Moisture stress, *Drought tolerance, *Evapotranspiration, Southwest U.S., Semiarid climates, Soil-water-plant relationships, Drought resistance, Leaves, Evaporation, Pressure measuring instruments, Diurnal, Environmental effects, Moisture uptake, Soil moisture.

Honey mesquite, Prosopis glandulosa var. glandulosa Torr., is an extravagant user of readily available soil water, and its persistence on the semiarid rangelands of the southwestern United States suggests that the plant's existence is dependent upon survival during periods of drought. Water use per leaf area in this plant has been found to diminish when the evaporative demand of the atmosphere exceeds the rate of water absorption, suggesting the existence of a drought-endurance mechanism. A lack of available information on the degree of water stress imposed by the high water-demand conditions led to this study in which water stress (as leaf water potential, LWP) was measured in honey mesquite by using the pressure-chamber method to detect negative hydrostatic pressure in the xylem of leaf petioles. Mean differences between sun-exposed and shaded leaves averaged 4.7 bars LWP on a clear day in May. Diurnal changes in LWP, often greater than 20 bars, were associated with changes in the evaporative potential of the atmosphere. Total daily water stress and net daily water stress were calulated by intergrating the area under a curve formed by the periodic measurements of LWP during the diurnal period. Net daily water stress was more sensitive to changes in environmental variables than other daily summaries. Throughout the range of available soil moisture there was a close relationship between net daily water stress and the integrated evaporative potential on a daily basis. (Gloyd-Arizona)
W73-12252

ECOLOGY OF INDIAN DESERT. VIII: ON THE WATER RELATIONS AND ASSIMILATE BALANCE OF SOME DESERT PLANTS,
Jodphur Univ. (India). Dept. of Botany.
T. Mathur, and D. N. Sen.
Annals of Arid Zone, Vol 11, Nos 1/2, p 18-30, March/June 1972, 10 fig, 3 tab, 16 ref.

Descriptors: *Soil-water-plant relationships, *Xerophytes, *Leaves, *Moisture stress, *Plant physiology, Mesquite, Soil water, Water loss, Stomata, Desert plants.
Identifiers: *India, Rajasthan Desert, Calotrope, Tephrosia.

Four species of xerophytes prevalent in the Rajasthan Desert, India, were studied to determine the mechanisms governing water loss, stomatal behavior, and relative water content of plant material, the latter being the ratio of water content in the field to that after plant material has been allowed to make up any deficity expressed as percentage. Tables show water loss by species by month, absolute moisture of leaf during different hours of the day during different months, presence of polysaccharides by species and month, nitrogen content of leaves by species and month. Species differed in their ability to withstand drought for their survival under xeric conditions, although all restricted loss of water substantially by keeping stomata partially closed. Percentage of absolute moisture in the calotropes was found to be maximum, possibly because of latex; it was minimum in the mesquite. Percentage of relative water content of the mesquite and the tephrosia decreased, but in the calotropes increased with decrease in soil moisture. (Paylore-Arizona)
W73-12254

BRYOPHYTES AS A GUIDE TO MINERALISATION,
Massey Univ., Palmerston North (New Zealand). Dept. of Chemistry and Biochemistry.
R. R. Brooks.
N Z J Bot, Vol 9, No 4, p 674-677, 1971.
Identifiers: Aquatic plants, *Bryophytes, Copper mosses, Exploration, Growth, Merceya, Mielichhoferia, *Minerals, Mineralization, *Mosses, Streams, Uranium, *New Zealand.

The use of bryophytes in mineral exploration is reviewed. 'Copper mosses,' mainly members of the genera Merceya and Mielichhoferia, grow preferentially over substrates with high Cu concentrations. Examination of the collection locality in herbarium specimens and subsequent exploration of this locality by conventional methods of mineral exploration can sometimes lead to discoveries of mineralization. In New Zealand, aquatic bryophytes have been used in the search for uranium, since they concentrate this element from streams draining uraniferous areas.--Copyright 1972, Biological Abstracts, Inc.
W73-12337

OBSERVATIONS ON PARAMECIUM OCCUPYING ARBOREAL STANDING WATER IN COSTA RICA,
Michigan Univ., Ann Arbor. Dept. of Zoology.
J. Vandermeer, J. Addicott, A. Andersen, J. Kitasako, and D. Pearson.
Ecology, Vol 53, No 2, p 291-293, 1972.
Identifiers: *Costa Rica, Distribution, Heliconia-M, *Mosquitos, *Paramecium, Standing water (Arboreal).

Some observations on the natural history of the Paramecium-Heliconia system are presented. The pattern of distribution in the wet season seems to be either a random colonization or a colonizing bias toward younger bracts, but ultimately the mosquito larvae in the older bracts build up, resulting in death of the local Paramecium population. The dry season pattern appears to be different at least in that there are very few mosquito larvae. The observation of Maguire and Belk (1967) that Paramecium do not occur in bromeliads was repeated. Experiments were performed demonstrating that if Paramecium do get to bromeliads, the biological interactions between the Paramecium and the regular microfauna of the bromeliad are such that the Paramecium are driven to extinction.--Copyright 1972, Biological Abstracts, Inc.
W73-12340

PRODUCTION OF FISH IN TWO SMALL STREAMS IN THE NORTH ISLAND OF NEW ZEALAND,
Marine Dept., Wellington (New Zealand). Fisheries Research Div.
C. L. Hopkins.
N Z J Mar Freshwater Res. Vol 5, No 2, p 280-290. 1971. Illus.
Identifiers: Anguilla-Australis-Schmidtii, Anguilla-Dieffenbachii, Diptera, Ephemeroptera, *Fish production, Galaxias-Divergens, Islands, *New Zealand, North, Philypnodon-Breviceps, Salmo-Trutta, Small streams.

Data are presented on biomass, mortality, growth, and production of fish populations inhabiting 2 small streams in the Wairarapa district of the North Island of New Zealand. The main water of both streams contained a mixed population of bullies (Philypnodon breviceps Stokell), brown trout (Salmo trutta Linn.), and eels (Anguilla dieffenbachii Gray, and A. australis schmidtii Phillipps). The headwater tributaries of one of the streams contained a large population of Galaxias divergens Stokell and a few eels, but other fish species were absent. All species of fish appeared to be using the same food supply of small benthic invertebrates, mainly ephemeropteran and dipteran larvae. Biomass of benthos per unit area was appreciably higher in the headwater tributary examined than in the main waters downstream. Mean annual stock of benthos in the tributary (Hinau north branch) was 19.75 g/m2, in the Hinau main water 10.71 g/m2 and in the Hinaki main water 13.47 g/m2. Nevertheless, production per unit area from the nearly monospecific fish population in the Hinau north branch (14.28 g/m2) was less than that of the mixed populations in the waters (24.17 g/m2 in the Hinau, 73.54 g/m2 in the Hanaki). Possibly fish production in the headwaters might be greater if the species composition of fish was more diverse.--Copyright 1972, Biological Abstracts, Inc.
W73-12347

2J. Erosion and Sedimentation

CRITERIA FOR STABLE EARTH CHANNEL DESIGN,
Soil Conservation Service, Upper Darby, Pa.
For primary bibliographic entry see Field 08B.
W73-11746

ICEFIELD RANGES RESEARCH PROJECT SCIENTIFIC RESULTS, VOLUME 3.
For primary bibliographic entry see Field 02C.
W73-11790

SOME ASPECTS OF THE GEOMORPHOLOGY OF MELTWATER STREAMS, STEELE GLACIER TERMINUS,
Alberta Univ., Edmonton. Dept. of Geology.
For primary bibliographic entry see Field 02C.
W73-11794

OBSERVATIONS ON AN ALPINE MUDFLOW, STEELE CREEK,
Alberta Univ., Edmonton. Dept. of Geology.
For primary bibliographic entry see Field 02C.
W73-11795

UP-HEAVED BLOCKS: A CURIOUS FEATURE OF INSTABILITY IN THE TUNDRA,
Portland State Univ., Oreg. Dept. of Geography.
For primary bibliographic entry see Field 02C.
W73-11807

THE SEDIMENTOLOGY OF A BRAIDED RIVER,
Ottawa Univ. (Ontario). Dept. of Geology.
P. F. Williams, and B. R. Rust.
In: Icefield Ranges Research Project Scientific Results, Vol 3, American Geographical Society, New York, NY, and Arctic Institute of North America, Montreal, Canada, p 183-210, 1972. 28 fig, 5 tab, 20 ref, append.

Descriptors: *Sedimentation, *Braiding, *Channel morphology, Stratigraphy, Sedimentary structures, Particle size, Sedimentation, Sediment transport, Bed load, Gravels, Glacial drift, Canada.
Identifiers: Donjek River (Canada).

A straight, four-mile tract of the Donjek River, Yukon Territory, is braided throughout, discharging about 50,000 cu ft per sec in flood. The active part of the tract shows upper-regime flow in the main channels, and lacks vegetation. Higher, older levels are former river courses, partly or completely vegetated, with continuous flow (principally lower regime) only in the main channels. The younger surfaces are more strongly dissected because of active channel cutting, whereas channels on older levels are subject to infilling. The sediments vary from clays to coarse gravels; most are poorly sorted. Three main groups are: silt and mud of low energy environments, such as abandoned channels; gravel of high energy channel-bar complexes; and a variable intermediate group which fills channels under medium-energy conditions. Seven facies are distinguished on textural, floral, and sedimentary structural characteristics. Facies relations are mostly gradational within channels, commonly fining upward. They are more complex between channels, and invariably erosional. The origin and directional significance of hierarchical orders of sedimentary structures were studied. Six hundred and sixty measurements of small-scale structures (mostly ripples) show moderate within-bar and between-bar variation, and give a grand vector mean 22 deg from the river trend. Bisectors of channel directional arcs (maximum and average ranges) approximate the river trend within 5 deg. (See also W73-11790) (Knapp-USGS)
W73-11808

VEGETATION, MICROTOPOGRAPHY, AND DEPTH OF ACTIVE LAYER ON DIFFERENT EXPOSURES IN SUBARCTIC ALPINE TUNDRA,
Portland State Univ., Oreg. Dept. of Geography.
L. W. Price.
In: Icefield Ranges Research Project Scientific Results, Vol 3, American Geographical Society, New York, NY, and Arctic Institute of North America, Montreal, Canada, p 211-220, 1972. 12 fig, 22 ref.

Descriptors: *Tundra, *Vegetation, *Solifluction, *Permafrost, Geomorphology, Canada, Vegetation effects, Topography, Arctic, Alpine.
Identifiers: Ruby Range (Canada).

Tundras on four slopes with different exposures (southeast-, southwest-, east-, and north-facing), but with similar gradients, elevations, and rock type, were studied in the Ruby Range, Yukon Territory. Vegetation was best developed on the southeast-facing slope, was successively less on east- and southwest-facing slopes, and least on the north-facing slope. Solifluction lobes were present in varying degrees, and their development largely followed that of vegetation in that they were best developed on the southeast-facing slope and least well developed on the north- and southwest-facing slopes. The vegetation occurred in sharply delineated communities across the lobes on the southeast-facing slope, and the communities repeated themselves in predictable patterns. The same communities were present on the east-facing slope, but were not as distinct. Plant cover was relatively impoverished on southwest- and north-facing slopes, where there were fewer microhabitats and where soil, moisture, and temperature conditions were not found in favorable combinations. Depth of the active layer largely corresponded to the presence of vegetation and microtopography. The active layer was shallowest and most variable on the southeast-facing slope. Plant cover, in general, was more important than exposure in determining the depth of thaw. (See also W73-11790) (Knapp-USGS)
W73-11809

THE COASTAL CHALLENGE,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02L.
W73-11810

PHOSPHATE IN SEDIMENTS OFF SOUTH-WESTERN AFRICA,
Woods Hole Oceanographic Institution, Mass.
C. P. Summerhayes, G. F. Birch, J. Rogers, and R. V. Dingle.
Nature, Vol 243, No 5409, p 509-511, June 29, 1973. 1 fig, 10 ref.

Descriptors: *Phosphates, *Sedimentation, *Continental shelf, *Africa, Sedimentology, Chemical precipitation.

The unconsolidated sediments of the continental shelf off southwestern Africa are considerably enriched in phosphate compared with the values considered usual for clastic sediments. Phosphorite still appears to be forming on a significant scale in the diatomaceous muds off southwest Africa. The abundance of phosphatic sediment is indirectly due to the upwelling of nutrient-enriched oceanic waters and consequent high biological productivity. Modern phosphorite seems to be forming diagenetically in the fine-grained organic rich sediment typical of this area of upwelling. But it is only forming in very small amounts. The bulk of the phosphate is bound in relict detrital gains of phosphorite. These were derived in the late Tertiary, or during low sea level times in the Pleistocene, by mechanical reworking of diatomaceous muds or by the erosion of previously existing phosphorite. (Knapp-USGS)
W73-11811

THE SIGNIFICANCE OF TIME-DEPENDENT TRANSPORTS IN STORM-GENERATED COASTAL CURRENTS,
Institute for Storm Research, Inc., Houston, Tex.
L. J. Goldman.
Society of Petroleum Engineers Journal, Vol 13, No 3, p 156-162, June 1973. 4 fig, 10 ref, append.

Descriptors: *Ocean currents, *Littoral drift, *Storms, *Currents (Water), Waves (Water), Mathematical models, Winds, Advection.

For the case of a storm over deep ocean, the equations of motion were tested by using time-dependent functions to generate the ocean transport. When the effect of a shoaling bottom near shore is considered, the contribution of the time-dependent transport is negligible, whereas the advective terms become important. Considering a storm with a constant speed in a specified direction, the continuity equation was derived for the generation of currents. For a stationary system, equations are not consistent for a steady-state solution except for special cases. For the current in the longshore direction, the geostrophic transport is balanced by stress, and the first term in the relation with the steady-state assumption, defined as the curl of the stress, is equal to the divergence of the flux. Nothing is to be gained by having a time-dependent transport that moves with a storm as a contributing term to coastal currents and storm tide. Wind building of transport at the shore is so large that there is only an insignificant correction from deep-water transports. (Knapp-USGS)
W73-11816

ROLE OF NATURAL AND ANTHROPOGENIC FACTORS IN MUDFLOW FORMATION IN THE UKRAINIAN CARPATHIANS (O ROLI PRIRODNYKH I ANTROPOGENNYKH FAKTOROV V SELEOBRAZOVANII V UKRAINSKIKH KARPATAKH),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
M. M. Ayzenberg.
In: Formirovaniye i raschety elementov rezhima rek; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 119, p 84-94, Moscow, 1972. 1 tab, 29 ref.

Descriptors: *Mudflows, *Mountains, Avalanches, Snow, Landslides, Talus, Weathering, Erosion, Precipitation (Atmospheric), Floods, Meteorology, Geology, Engineering geology, Geomorphology, Hydrogeology, Vegetation, River basins.
Identifiers: *Ukraine, *Carpathians, Geodynamics.

The combination of geodynamic conditions and hydrometeorological factors favors the formation of mudflows in the Ukrainian Carpathians. Mudflows are most widespread in upper reaches of the Prut and Tisza River basins, the Bystritsa Nadvornyanskaya River basin, and on other rivers in the Dniester basin, where erosion, landslides, avalanches, talus, and weathering are the principal physiographic phenomena and processes promoting mudflow formation. Precipitation is the most important climatic (meteorological) factor, and snow avalanches commonly occur with mudflows. To study the role of natural and anthropogenic factors in mudflow formation in the region, serious attention must be given to geological, geomorphological, hydrogeological, and biocenotic conditions; to present geological processes; and to hydrometeorological factors. (See also W73-11825) (Josefson-USGS)
W73-11830

INVESTIGATION OF MUDFLOWS IN THE CHEREMOSH RIVER BASIN IN CONNECTION WITH DESIGN OF THE ROSTOKI RESERVOIR (ISSLEDOVANIYE SELEY V BASSEYNE R. CHEREMOSH V SVYAZI S PROYEKTIROVANIYEM ROSTOKINSKOGO VODOKHRANILISHCHA),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
M. M. Ayzenberg, M. L. Vol'ftsun, Ye. V. Khloyeva, and V. V. Yablonskiy.
In: Formirovaniye i raschety elementov rezhima rek; Ukrainskiy Nauchno-Issledovatel'skiy

Gidrometeorologicheskiy Institut Trudy, No 119, p 95n105, Moscow, 1972. 1 fig, 1 tab, 19 ref.

Descriptors: *Mudflows, *Reservoirs, *Reservoir design, *River basins, Erosion, Landslides, Talus, Deposition (Sediments), Sediment transport, Sediment sorting, Precipitation (Atmospheric), Floods, Probability, Equations.
Identifiers: *Cheremosh River, *Rostoki Reservoir, Carpathians.

The proposed area of the Rostoki Reservoir on the Cheremosh River is located in the southeastern region of the Carpathians, where mudflow occurrence is most frequent. Intense erosion and presence of landslides and talus in the area favor extensive sediment deposition in the planned reservoir. The volumes of mudflow deposits for the outstanding flood observed in June 1969 and for floods of 1% probability were obtained from analyses of data of hydrometric and meteorological observations as well as from general patterns of mudflow formation. (See also W73-11825) (Josefson-USGS)
W73-11831

DETERMINATION OF SUSPENDED-SEDIMENT DISCHARGES OF VARIOUS PROBABILITIES ON RIVERS IN THE UKRAINE (K OPREDELENIYU KHARAKTERISTIK STOKA VZVESHENNYKH NANOSOV REK UKRAINY RAZLICHNOY OBESPECHENNOSTI),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
Z. A. Goretskaya.
In: Formirovaniye i raschety elementov rezhima rek; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 119, p 106-114, Moscow, 1972. 3 fig, 2 tab, 4 ref.

Descriptors: *Sediment discharge, *Suspended solids, *Rivers, *Probability, Discharge (Water), Flood discharge, Floods, Storm runoff, Equations, Curves.
Identifiers: *Ukraine.

Calculations are made of average long-term sediment discharge for lowland rivers in the Ukraine with a short period of record and of probabilities of various annual sediment discharges for ungaged rivers. To determine average long-term sediment discharge, techniques were developed to extend the periods of record, based on a relation of annual sediment discharge to magnitude and intensity of floods. Assumed average water discharge was used as a basis for determining spring-flood discharges. Whenever storm flood contributed to annual sediment discharge, the sum of spring- and storm-flood discharges was used. Extended periods of record of sediment discharge for Ukrainian rivers were subjected to statistical processing to determine relations of average annual sediment discharge to annual sediment discharge of various probabilities. Regional conversion factors, applicable within physiographically homogeneous regions, are proposed for calculating annual sediment discharge for ungaged rivers. (See also W73-11825) (Josefson-USGS)
W73-11832

THE MEANDERING OF ALLUVIAL RIVERS,
Uppsala Univ. (Sweden). Depth of Physical Geography.
L. Hakanson.
Nordic Hydrology, Vol 4, No 2, p 119-128, 1973. 1 fig, 72 ref.

Descriptors: *Channel morphology, *Erosion, *Meanders, *Alluvial channels, *Sediment transport, Alluvium, Sedimentation, Bed load, Scour, Open channel flow.

The formation of meanders is explained by basic physical principles of flowing turbulent water and its interaction with the river bed. Starting from an initially straight and smooth channel, the most probable site of the first erosional scar will be lateral from the center of the river. This scar will then develop into a cavity, which in turn will affect the streamline situation of the flow. In front of the cavity the streamlines will converge, and behind it they will diverge. The diverging streamlines, together with unaffected or less affected streamlines, will then create a new convergence zone behind the first cavity but on the opposite side of the river's center line. The ultimate and most probable and stable result will be a meander. (Knapp-USGS)
W73-11844

MAJOR AQUIFERS AND SAND AND GRAVEL RESOURCES IN DAY COUNTY, SOUTH DAKOTA,
South Dakota State Geological Survey, Vermillion.
For primary bibliographic entry see Field 02F.
W73-11847

EROSION PREVENTION DURING HIGHWAY CONSTRUCTION BY THE USE OF SPRAYED ON CHEMICALS,
Virginia Highway Research Council, Charlottesville.
For primary bibliographic entry see Field 05G.
W73-11855

STREAM-PROFILE ANALYSIS AND STREAM-GRADIENT INDEX,
Geological Survey, Washington, D.C.
J. T. Hack.
Journal of Research, U.S. Geological Survey, Vol 1, No 4, p 421-429, July-August 1973. 8 fig, 11 ref.

Descriptors: *Terrain analysis, *Profiles, *Gradients (Streams), *Geomorphology, Maps, Slopes, Sediment transport, Alluvial channels, Degradation (Stream).
Identifiers: *Stream-gradient index.

The geometry of drainage networks is the basis for a simple method of terrain analysis providing clues to bedrock conditions and other factors that determine topographic forms. On a reach of any stream, a gradient-index value can be obtained which allows meaningful comparisons of channel slope on streams of different sizes. The index reflects stream power or competence and is simply the product of the channel slope at a point and channel length measured along the longest stream above the point where the calculation is made. In an adjusted topography, changes in gradient-index values along a stream correspond to differences in bedrock or introduced load. In any landscape the gradient index of a stream is related to total relief and stream regimen. Thus, climate, tectonic events, and geomorphic history must be considered in using the gradient index. Gradient-index values can be obtained quickly by simple measurements on topographic maps, or they can be obtained by more sophisticated photogrammetric measurements that involve simple computer calculations. (Knapp-USGS)
W73-12064

CURRENT SLOPE-STABILITY STUDIES IN THE SAN FRANCISCO BAY REGION,
Geological Survey, Menlo Park, Calif.
T. H. Nilsen, and E. E. Brabb.
Journal of Research, U.S. Geological Survey, Vol 1, No 4, p 431-437, July-August 1973. 3 fig, 34 ref.

Descriptors: *California, *Slope stability, *Landslides, Geomorphology, Degradation (Slope), Erosion, Mass wasting.
Identifiers: *San Francisco Bay region (Calif).

An extensive program of slope-stability studies is presently underway in the San Francisco Bay region, California. Work to date has resulted in the publication of estimates of landslide damage, an estimated-landslide-abundance map of the region, new slope maps prepared by photomechanical processes, photointerpretive maps of landslide, colluvial, and other surficial deposits, and maps of relative slope stability. Landsliding is a major slope-erosion process in the region. The damage resulting from landsliding is very great, and additional development in the upland parts of the region should not be undertaken without careful evaluation of slope stability. (Knapp-USGS)
W73-12065

NEARSHORE CURRENTS AND THE EQUILIBRIUM CUSPATE SHORELINE,
Oregon State Univ., Corvallis. School of Oceanography.
P. D. Komar.
Available from NTIS, Springfield, Va. 22151 as COM-72 10915 Price $3.00 printed copy; $1.45 microfiche. Technical Report 239 (Reference 72-15), May 1972. 20 p, 5 fig, 1 tab, 12 ref.

Descriptors: *Beaches, *Rip currents, *Beach erosion, *Sands, Shores, Data collections, Waves (Water), Model studies, Equations, Oceanography, Tidal effects.
Identifiers: *Cuspate shoreline, Longshore current.

A laboratory experiment was described by Komar (1971) in which rip currents on a beach produced cusps but then suddenly ceased to flow. It was concluded that with a cuspate shoreline a balance can exist between the longshore forces due to an oblique wave approach, tending to produce a longshore current, and the driving forces of the cell circulation, a nonuniform wave breaker height along the shoreline. The equilibrium condition is examined further. The relationship describing the equilibrium is fully derived and used to generate a series of theoretically possible cuspate shoreline forms. When the equilibrium is not complete there may be 'residual' longshore currents due to the lack of balance between the driving forces. A relationship is derived for the longshore current resulting from a combination of a wave height gradient and an oblique wave approach. The 'residual' longshore current could flow either towards the apex of the cusp or towards the embayments, depending on the balance. This may account for the observation that rip currents are sometimes found at the apex and at other times within the embayments of the cusps. (Woodard-USGS)
W73-12075

GEOTECHNICAL PROPERTIES OF OCEAN SEDIMENTS RECOVERED WITH GIANT PISTON CORER: 1. GULF OF MAINE,
Worcester Polytechnic Inst., Mass. Dept. of Civil Engineering.
A. J. Silva, and C. D. Hollister.
Journal of Geophysical Research, Vol 78, No 18, p 3597-3616, June 20, 1973. 8 fig, 3 tab, 51 ref. N00014-66-C-0241, N00014-72-a-037-001.

Descriptors: *Cores, *Atlantic Ocean, *Bottom sediments, Clays, Physical properties, Shear strength, Mineralogy, Sampling, Sedimentology.
Identifiers: *Gulf of Maine.

A large-diameter (14 cm) long piston corer (20-40 m) was used to obtain relatively undisturbed sediment samples in water depths from 80 to 5500 m with recovery ratios ranging between 0.76 and 0.87. The first recovered core was taken in the Stellwagen basin, western Gulf of Maine, at 81-m water depth using a pipe length of 33.5 m and total core weight of 3500 kg. The 21.74 m of recovered sediment is black, gray to olive green silty illitic clay. Structural disturbance of the sediments was not severe, and no postdepositional compaction occurred. Another core was taken about 3 km east of the first core location, and 19.65 m of sediment

were recovered. An anomalous zone reveals high water content (96%) and high shear strength. A marked abundance of diatoms may explain the high water content, and the highly flocculated nature of the abundant clay minerals accounts for the high shear strength. (Knapp-USGS)
W73-12085

AN INFILTRATION MODEL TESTED WITH MONOLITH MOISTURE MEASUREMENTS,
Agricultural Research Service, Brookings, S. Dak. Soil and Water Conservation Research Div.
C. A. Onstad, T. C. Olson, and L. R. Stone.
Soil Science, Vol 116, No 1, p 13-17, July 1973. 3 fig, 1 tab, 12 ref.

Descriptors: *Infiltration, *Soil water movement, *Equations, Hydraulic conductivity, Wetting, Antecedent precipitation, Porosity, Infiltration rates.
Identifiers: Green and Ampt equation.

The Green Ampt equation was used to model mass infiltration curves obtained from flooding soil monoliths. Eight calculations were made on five monoliths under various antecedent moisture conditions. The input parameters, hydraulic conductivity, pressure head, and fillable porosity were measured for soil layers in the vicinity on the monoliths using simple field techniques. The infiltration into the monoliths was calculated and objectively compared with the measured infiltration. In general, the simulations were acceptable but subject to local variations. In general, the model underestimated infiltration volumes especially at times greater than 100 minutes. Local soil conditions influence the results to a considerable extent. (Knapp-USGS)
W73-12087

THE PREDICTION OF SOIL OCCURRENCE IN CERTAIN DESERT REGIONS OF THE SOUTHWESTERN UNITED STATES,
Soil Conservation Service, University Park, N. Mex.
For primary bibliographic entry see Field 02G.
W73-12256

CHEMICAL VARIATIONS IN SEDIMENTARY FACIES OF AN INNER CONTINENTAL SHELF ENVIRONMENT, NORTHERN GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Geology.
T.T. Tieh, T. E. Pyle, D. H. Eggler, and R. A. Nelson.
Sedimentary Geology, Vol 9, No 2, p 101-115, May 1973. 7 fig, 3 tab, 8 ref.

Descriptors: *Bottom sediments, *Gulf of Mexico, *Continental shelf, *Geochemistry, Trace elements, Distribution patterns, Sedimentation, Sedimentology, Statistical methods, Provenance, Sediment transport, Mineralogy.
Identifiers: Trend surface analysis.

Four major sedimentary provinces of the inner continental shelf off the Louisiana coast may be recognized by textural studies: deltaic, nondeltaic, and relict sediments; and delta-destructional sands. Samples from these provinces were analyzed for Rb, Sr, Ni, Fe, Mn, Ti, and Zr; trend surface analysis was used to discern regional distribution of these elements. Although deltaic and nondeltaic sediments cannot be distinguished by chemical criteria, they are distinct from relict sediments, which are low in Mn, Fe, Ti, Zr, Rb, and Ni, and high in Sr. The delta-destructional sands differ from the other three provinces by their low contents of Mn, Fe, Rb, and Ni, and high Ti, Zr, and Sr. In an energetic environment such as this, processes subsequent to deposition tend to disperse Rb, Fe, Ni, and Mn, as these elements are closely associated with the clays; these processes may give rise to enrichment of Zr due to the high stability and density of the mineral zircon, or the enrichment of Sr by accumulation of organic remains. (Knapp-USGS)
W73-12299

BED FORMS OF THE MEDITERRANEAN UNDERCURRENT OBSERVED WITH SIDE-SCAN SONAR,
National Inst. of Oceanography, Wormley (England).
For primary bibliographic entry see Field 02L.
W73-12300

INTERSTITIAL WATER COMPOSITION IN BARATARIA BAY (LOUISIANA) SEDIMENT,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
For primary bibliographic entry see Field 02L.
W73-12302

COARSE-GRAINED SEDIMENTATION ON A BRAIDED OUTWASH FAN, NORTHEAST GULF OF ALASKA,
South Carolina Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 02L.
W73-12307

DISPOSITION OF SPOIL ON THE DUMP SITE,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 05E.
W73-12318

SEDIMENTS OF THE DREDGING AND DISPOSAL AREAS,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 05E.
W73-12319

CHARACTERISTICS OF THE PHYSICAL ENVIRONMENT,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 05E.
W73-12320

2K. Chemical Processes

ABUNDANCES OF ISOTOPIC SPECIES OF WATER IN THE ST. ELIAS MOUNTAINS,
Alberta Univ., Edmonton.
For primary bibliographic entry see Field 02C.
W73-11802

PHOSPHATE IN SEDIMENTS OFF SOUTH-WESTERN AFRICA,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 02J.
W73-11811

SALTS IN THE SEA,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
E. T. Degens.
Nature, Vol 243, No 5409, p 504-507, June 29, 1973. 1 fig, 3 tab, 25 ref.

Descriptors: *Sea water, *Water chemistry, *Lakes, Provenance, Salinity, Salts, Structural geology, Paleohydrology.

Salty hydrothermal solutions are discharged along rift valleys. Their composition gives insight into the chemical evolution of the sea. Lake Kimu is situated about 100 miles north of Lake Tanganyika at the highest point of the East African rift valley, 1,500 m above sea level. The greatest water depth measures 500 m; reducing conditions prevail below about 50 m. The lake is surrounded by active volcanoes, and is fed by salty hydrothermal springs; stable isotope data indicate that the hydrothermal reservoir is charged by local rainwater. The chemical composition of deep Lake Kivu and Kabuno Bay water roughly mirrors, in kind and proportion, the original salt composition of hydrothermal solutions emanating from active rift zones. Based on this assumption, the type and quantity of salts released to the ocean via hydrothermal channels can be calculated. Two types of hydrothermal water can be recognized. The first is associated with active rift zones, and the second is generated from geosynclinal sediments in the process of mountain building. Both are principally of meteoric origin. Ascending rift water supplies new salts to the ocean, whereas rising geosynclinal water recycles salts derived from ancient sediments. The enrichment of sodium and potassium in the continental crust relative to the oceanic crust is attributable to addition of alkalis to the ocean in the vicinity of rifts, removal of potassium by clays, and release of sodium-rich formation water during granitization. Seawater began as a carbonate solution rich in magnesium. It gradually evolved to sodium chloride dominance. The excess CO2 was removed by carbonate deposition and inorganic and biological CO2 reduction. (Knapp-USGS)
W73-11812

TITRATION OF SULPHATE IN MINERAL WATERS AND SEA WATER BY USING THE SOLID-STATE LEAD ELECTRODE,
Rome Univ. (Italy). Istituto di Chimica Analitica.
M. Mascini.
Analyst, Vol 98, No 1166, p 325-328, May 1973. 1 fig, 2 tab, 6 ref.

Descriptors: *Water analysis, *Sulfates, *Electrochemistry, Electrodes, Chemical analysis, Instrumentation, Mineral water, Sea water.
Identifiers: *Lead electrodes, Titration.

A procedure is described for the determination of sulfate in the range 20 to 3,000 ppm in mineral and seawaters by using a lead-selective electrode. Chloride and hydrogen carbonate are separated from the sample by passing it first through a cation-exchange resin in the silver form, and secondly through a cation-exchange resin in the acid form. The solution recovered is titrated with standard lead nitrate solution. (Knapp-USGS)
W73-11818

FIELD STUDIES ON SALT LEACHING IN A HIGHLY SALINE SODIC SOIL,
Central Soil Salinity Research Inst., Karnal (India).
For primary bibliographic entry see Field 02G.
W73-11835

IONIC MIGRATION AND WEATHERING IN FROZEN ANTARCTIC SOILS,
Washington Univ., Seattle.
F. C. Ugolini, and D. M. Anderson.
Soil Science, Vol 115, No 6, p 461-470, June 1973. 3 fig, 3 tab, 34 ref.

Descriptors: *Weathering, *Soil formation, *Tracers, *Permafrost, *Antarctic, Sodium, Chlorides, Salts, Diffusion, Ion transport, Frozen soils, Thawing.

Soils of continental Antarctica are developing in one of the most severe terrestrial climates. The persistently low temperatures and the paucity of liquid water have led to soils that are dry, devoid of organic matter, and generally coarse, with poorly developed horizons. Salts are usually present and desert pavement is found in place of the organic layer. Summer thaw, which always is shallow, seldom results in the appearance of liquid water. A preliminary experiment conducted during

the summer of 1968 indicated that Cl ion moved upward in the dry, cold soils of the Lower Wright Valley, Antarctica, during a period of 25 days. During summer of 1969 NaCl was placed at the top of the ice-cemented permafrost at three sites. Na had a maximum migration distance of 5 cm in 2 years. Because prevailing temperatures at these sites are below 0 deg C most if not all of the year, the migration of ions and solutes within the soil profile must occur by diffusive movement in thin films of unfrozen water that separate the mineral surfaces from ice, and in thin films of adsorbed water in those regions devoid of ice. Although the rate of weathering may be slow, the presence of liquid water films of high ionic strength bathing the mineral grains makes mineral dissolution and alteration inevitable. The major differences between weathering in the Antarctic and the weathering of temperate regions are in the rate of weathering and the redistribution of the products of weathering. In Antarctica, which has very immature soils on moraines of about 7,000 years in age, the rate of weathering is very slow. (Knapp-USGS)
W73-11836

METHANE IN LAKE KIVU: NEW DATA BEARING ON ITS ORIGIN,
Woods Hole Oceanographic Institution, Mass.
W. G. Deuser, E. T. Degens, G. R. Harvey, and M. Rubin.
Science, Vol 181, No 4094, p 51-53, July 6, 1973. 1 fig, 1 tab, 6 ref.

Descriptors: *Methane, *Lakes, *Aquatic bacteria, Carbon dioxide, Hydrogen, Methane bacteria, Stable isotopes, Africa, Isotope fractionation.
Identifiers: Lake Kivu (Africa).

Lake Kivu, an African rift lake, contains about 50 cubic kilometers of methane (at standard temperature and pressure) in its deep water. Data resulting from two recent expeditions to the lake and a reevaluation of earlier data suggest that most of the methane was formed by bacteria from abiogenetic carbon dioxide and hydrogen, rather than being of volcanic origin or having formed from decomposing organic matter. (Knapp-USGS)
W73-11837

IN SITU SAMPLER FOR MARINE SEDIMENTARY PORE WATERS: EVIDENCE FOR POTASSIUM DEPLETION AND CALCIUM ENRICHMENT,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
For primary bibliographic entry see Field 07B.
W73-11840

CHEMOSTASIS AND HOMEOSTASIS IN AQUATIC ECOSYSTEMS: PRINCIPLES OF WATER POLLUTION CONTROL,
Harvard Univ., Cambridge, Mass. Labs. of Applied Chemistry and Applied Biology.
For primary bibliographic entry see Field 05C.
W73-11935

TIME TO CHEMICAL STEADY-STATES IN LAKES AND OCEANS,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
A. Lerman.
In: Nonequilibrium Systems in Natural Water Chemistry, Symposium of the American Chemical Society, Division of Water, Air, and Waste Chemistry, February 24-25, 1970, Houston, Texas, p 30-76. 16 fig, 47 ref.

Descriptors: *Chemical properties, *Water chemistry, *Model studies, Chemical reactions, Equilibrium, Diffusion, Advection, Chemical reactions, Equations.
Identifiers: *Chemical steady-states, Chemical transport mechanisms, Chemical diffusion coefficients.

In general, nonhomogeneous distributions of chemical species are a combination of the environmental geometry, its shape and location of the 'sources' and 'sinks' of the chemical species, mechanisms of transport of matter through the system, and nature and rates of the chemical reactions in which the species enter. To visualize the significance of geometric, physical, and chemical factors, a system consisting of a sediment and a water column above it might be considered. The geometric factors in this case are location of sources of the chemical species--at the sediment-water interface, within the sediment, or distributed throughout the water column--and its sinks, such as removal by a chemical or biochemical reaction occurring throughout the system, removal in outflow, or evaporation. The transport mechanisms include dispersal by diffusional processes, water flow (advection), settling of biological or detrital particles through the water column, and accumulation of sediment on the floor. Models of transient and stationary states are described, including transport of conservative chemical species in two- and three-layer lakes, transport of salt between Dead Sea brine layers, oxygen and radium-226 in the oceanic water column, and reacting and conservative species in sediment. (Jones-Wisconsin)
W73-11936

KINETICS OF THE NONBIOLOGICAL DECOMPOSITION AND RACEMIZATION OF AMINO ACIDS IN NATURAL WATERS,
Harvard Univ., Cambridge, Mass. Hoffman Lab.
J. L. Bada.
In: Nonequilibrium Systems in Natural Water Chemistry, Symposium of the American Chemical Society, Division of Water, Air and Waste Chemistry, February 24-25, 1970, Houston, Texas, p 309-331. 3 fig, 3 tab, 95 ref.

Descriptors: *Amino acids, *Degradation (Decomposition), Oxidation, Dendrochronology, Organic matter.
Identifiers: *Dissolved amino acids, *Racemization, Decarboxylation.

Rates of several nonbiological reactions involving amino acids have been evaluated and used to estimate importance of various reactions in natural waters. Rates of most of these reactions are very slow at neutral pH and OC. The fastest reaction under aerobic conditions is a metal ion catalyzed oxidation. The decomposition kinetics of the various amino acids indicate that if dissolved amino acids are not consumed by organisms, they would remain in natural waters for thousands of years or longer. Since the amino acids in natural waters are of biological origin, they should be largely of the L-configuration. By measuring the ratio of the D to L enantiomers of a particular amino acid, it is possible to estimate age of the amino acids dissolved in natural waters. Sedimentation rates and sediment age can be estimated by the racemization of amino acids in the sedimentary column. Rate of nonbiological decomposition and alteration of dissolved organic matter can be determined by studying the kinetics of reactions involving other dissolved organic constituents, and would be useful in estimating how long organic molecules would persist in aquatic environments if not degraded by organisms. (Jones-Wisconsin)
W73-11938

EFFECT OF CLAY ON THE AVAILABILITY OF DILUTE ORGANIC NUTRIENTS TO STEADY-STATE HETEROTROPHIC POPULATIONS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 05C.
W73-11954

EXTENT OF DEVELOPMENT AND HYDROLOGIC CONDITIONS OF THE ALLUVIAL AQUIFER, FOUNTAIN AND JIMMY CAMP VALLEYS, COLORADO, 1972,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02F.
W73-12023

SIMULATION OF HYDROLOGIC AND CHEMICAL-QUALITY VARIATIONS IN AN IRRIGATED STREAM-AQUIFER SYSTEM--A PRELIMINARY REPORT,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02A.
W73-12024

FLOW AND CHEMICAL CHARACTERISTICS OF THE ST. JOHNS RIVER AT JACKSONVILLE, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 02L.
W73-12030

MOVEMENT AND QUALITY OF LONG ISLAND SOUND WATERS, 1971,
State Univ., of New York, Stony Brook. Marine Sciences Research Center.
C. D. Hardy.
Technical Report Series No 17, November 1972. 66 p, 49 fig, 28 ref, 1 append.

Descriptors: *Water quality, *Bays, *New York, Water pollution sources, Data collections, Sampling, Chemical properties, Physical properties, Geology, Inflow, Sewage, Nutrients, Dissolved oxygen, Water temperature, Winds, Currents (Water), Path of pollutants, Water analysis, Analytical techniques, Salinity, Tidal effects.
Identifiers: Lower New York Bay, Upper New York Bay, East River (N Y), Long Island Sound (N Y), Block Island Sound (N Y).

The hydrographic features of lower New York Bay, upper New York Bay, the East River, Long Island Sound, and Block Island Sound are described. Winter- formed bottom water exhibits a seasonal lag in warming in the Central Basin of Long Island Sound. The persistence into summer of this colder and denser bottom layer causes limited mixing. The stagnation of this bottom water is promoted by the seasonal formation of a weak thermocline and the inhibition of exchange with Block Island Sound water by the presence of a submarine ridge. A heavy biological oxygen demand is imposed upon the bottom water by the introduction of oxidizable organicmatter from the New York metropolitan area. The depletion of dissolved oxygen is correlated on an annual basis in accord with the frequency and strength of winds. In summer, prolonged periods of calm intensify the vertical stratification, causing seriously lowered dissolved oxygen concentrations in the bottom layer. Maximum concentrations of nutrients (ammonia, urea, orthophosphate) were in the upper East River, reflecting the fact that 43% of the sewage from the New York City municipal system discharges into the upper East River. A two-layered transport system is proposed by which the net transport of East River water into Long Island Sound may be explained. (Woodard-USGS)
W73-12072

WATER QUALITY SURVEY OF THE POTOMAC ESTUARY EMBAYMENTS AND TRANSECTS.
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.
For primary bibliographic entry see Field 05A.
W73-12077

WATER QUALITY OF THE POTOMAC ESTUARY GILBERT SWAMP AND ALLEN'S FRESH AND GUNSTON COVE.
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.

1970 Data Report No 30, 1973. 18 p.

Descriptors: *Water analysis, *Water quality, *Chemical analysis, *Estuaries, *Maryland, Tributaries, Potomac River, Channeling, Environmental effects, Sampling, Analytical techniques, Organic compounds, Inorganic compounds, Water chemistry, Physical properties, Eutrophication.
Identifiers: *Gilbert Run Watershed (Md), Potomac estuary.

The purpose was to establish ambient water quality in the Gilbert Run watershed, Maryland, prior to channel disturbance resulting from the channelization project conducted by the Federal Soil Conservation Service. A special water quality survey of Gunston Cove was started in the spring of 1970 continuing through September to determine the eutrophic condition of the embayment area. The bi-monthly samples taken of Gilbert Swamp and Allen's Fresh for six months, January-July 1970, were analyzed for nutrients, DO, carbon, chlorophyll a and turbidity. Analyses on monthly Gunston Cove samples included nutrients, DO, BOD, carbon, chlorophyll a, coliform and fecal coliform. Other parameters include water temperature and pH. Analytical methods and results are presented. (Woodard-USGS)
W73-12078

SURVEY RESULTS OF THE CHESAPEAKE BAY INPUT STUDY.
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.
For primary bibliographic entry see Field 05A.
W73-12079

MAGNESIUM TO CHLORINITY RATIOS IN SEAWATER,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
J. H. Carpenter, and M. E. Manella.
Journal of Geophysical Research, Vol 78, No 18, p3621-3626, June 20, 1973. 1 fig, 2 tab, 17 ref. USAEC Contract AT (11-1)3292.

Descriptors: *Sea water, *Chlorides, *Magnesium, Water chemistry, Sampling.

No evidence was found that the Mg/Cl ratios for North Atlantic water vary with depth or time by as much as 0.1%. The Mg/Cl ratio for seawater appears to be smaller than previously estimated. Samples collected in the Sargasso Sea were analyzed, and temporal or depth variations of the magnesium-chlorinity ratios were within the analytical uncertainties of 0.05%. The mean value of the ratio was 0.06626, which is discrepant from previous estimates by 1%. (Knapp-USGS)
W73-12086

DETERMINATION OF CHLORIDE IN AQUEOUS SOIL EXTRACTS AND WATER SAMPLES BY MEANS OF A CHLORIDE-SELECTIVE ELECTRODE,
Norges Landbrukshoegskole, Vollebekk. Chemical Research Div.
For primary bibliographic entry see Field 05A.
W73-12088

CHEMICAL CHARACTERISTICS OF UNDERGROUND CHALK WATER IN ESSEX AND SUFFOLK,
Essex River Authority (England).
For primary bibliographic entry see Field 05B.
W73-12180

CHEMICAL VARIATIONS IN SEDIMENTARY FACIES OF AN INNER CONTINENTAL SHELF ENVIRONMENT, NORTHERN GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W73-12299

ANGULAR DEPENDENCE OF SUBSTITUENT EFFECTS IN RIGID, BICYCLIC SYSTEMS,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
C. L. Liotta, W. F. Fisher, and C. L. Harris.
Chemical Communications, 1971. p 1312-1313, 2 tab, 6 ref. OWRR B-049-GA (1).

Descriptors: *Water chemistry, *Chemical reactions, *Hydrolysis, *Organic compounds, Carbon, Hydrogen, Oxygen, Model studies.
Identifiers: *Alkaline hydrolysis, Octane esters.

The rates of alkaline hydrolysis of the isometric ethyl 5,6-epoxybicyclo (2,2,2)octane-2-carboxylates and ethyl bicyclo (2,2,2)octane-2-carboxylate have been measured, and the results analyzed in terms of the two limiting models for the transmission of nonconjugative substituent effects--the inductive and the field models. In order to evaluate the ability of the inductive and field models in describing the transmission of nonconjugative substituent effects, the isometric ethyl 5,6-epoxybicyclo- (2,2,2)octane-2-carboxylates and ethyl bicyclo- (2,2,2)octane-2-carboxylate have been synthesized and their rates of alkaline hydrolysis measured in 50% (by weight) aqueous ethanol at 25 deg. The second-order rate coefficients are summarized. (Woodard-USGS)
W73-12305

A PEDOCHEMICAL SURVEY: I. LITHIUM,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Soil Bureau.
N. Wells, and J. S. Whitton.
N Z J Sci, Vol 15, No 1, p 90-106, 1972, Illus.
Identifiers: Fertilizers, *Lithium, *Pedochemical survey, Plants, Rock, *Emission spectrography, Surveys, *New Zealand.

The Li contents of rocks, soils, plants, waters and fertilizers in New Zealand were measured by emission spectrography as part of a survey of many elements by various spectrographic techniques. Data are presented for 66 soil-forming rocks, 27 soil profiles, 72 topsoils, 14 litters, 12 spp of plants including 5 seaweeds, 11 river and irrigation waters and 16 fertilizers. In common soil-forming rocks high amounts of Li occur in mudstones, basaltic tuff, rhyolite and mica schist; low amounts occur in limestones, basalts and ultrabasic rocks. Lithium is retained by clay minerals produced during soil weathering, but it can be lost from topsoils during podzolization. The element is not held by organic matter and consequently it is only a minor component of organic soils and litter layers. Plants with high amounts of Li occur on soils flushed by hydrothermal waters and on saline gley recent soils flushed by sea water. Plants with low amounts of the element occur on soils that are strongly weathered and strongly leached. Li held within the structure of clay minerals, e.g. gibbsite, is not available to plants. Fertilizers have a low content of Li, the organic fertilizers being particularly low in this element. Irrigation waters and most rivers have well below the recognized toxic limit for plant growth, but waters of hydrothermal origin have above this level.--Copyright 1973, Biological Abstracts, Inc.
W73-12331

THE TRANSFORMATION OF NITROGEN AND CARBON IN THE SOIL DURING HUMIFICATION OF STRAW LABELLED WITH N15,
Wyzsza Szkola Rolnicza, Poznan (Poland). Dept. of Plant Physiology.
For primary bibliographic entry see Field 02G.
W73-12342

ISOTOPIC COMPOSTION OF WATERS OF THE BROADLANDS GEOTHERMAL FIELD,
Department of Scientific and Industrial Research, Wairakei (New Zealand). Chemistry Div.
W. Giggenbach.
N Z J Sci. Vol 14, No 4, p 959-970. 1971. Illus.
Identifiers: *Isotopic composition (Water), *New Zealand (Broadlands), Thermal waters, *Geothermal fields.

The deuterium and O-18 concentrations of steam and water samples from drillholes 2, 3, 4, 7, 8, 9, 11, 13, 19 and 20 at Broadlands, New Zealand, together with 6 surface water samples from Lake Taupo, Waikato River, and Kaingarosa Forest streams, were determined. The isotopic data agree with the possibility of the thermal waters being derived from local precipitation. These waters undergo O-18 exchange with rocks of the hot aquifer leading to the formation of a deep water with a chloride concentration of about 1150 ppm. The waters entering the drillholes contain varying amounts of excess steam derived from this water at temperatures around 260C. Dilution by cooler and lower chloride waters, or conductive heat changes appear to be of minor significance in influencing the isotopic and chemical composition, and the enthalpies of the drillhole discharges.--Copyright 1972, Biological Abstracts, Inc.
W73-12349

2L. Estuaries

THE COASTAL CHALLENGE,
Scripps Institution of Oceanography, La Jolla, Calif.
D. L. Inman, and B. M. Brush.
Science, Vol 181, No 4094, p 20-32, July 6, 1973. 13 fig, 3 tab, 51 ref. NOAA SG 04-3-158-22.

Descriptors: *Coasts, *Beaches, *Beach erosion, *Water pollution, *Conservation, Protection, Erosion control, Coastal engineering, Littoral drift, Littoral, Recreation, Preservation, Sediment transport.
Identifiers: Coastal conservation.

Man's rapidly expanding use of the ocean and his increasing incursion into it commonly involves processes that take place in shallow water. These shallow waters are experiencing the bulk of the impact of waste discharges, thermal and radioactive pollution, dredging, coastal construction, mining, and poaching. Processes in nearshore waters are driven by basic, interrelated forces that are systematic and essentially regular in form. These systematic driving forces lead to the development of coherent processes such as the nearshore circulation cells and the longshore transport of sand. Most of the energy for these processes comes from the sea. It is translated by the stress from winds which blow over the ocean and generate waves. Man's intervention takes three interrelated forms: the impact of numbers of people, all competing for portions of the coastal zone; the pollution and contamination of coastal waters; and the critical modification of the natural balance in the ecology of plants and animals and in the sources of sediments. It is imperative that we develop the means to preserve the beaches and harbors that we now have and that we develop practical techniques for creating new beaches and nearshore structures that are less damaging to the environment. From an environmental standpoint there are three fundamental steps necessary for the good design of coastal structures: identification of the important processes operative in an environment, understanding of their relative importance and their mutual interactions, and the correct analysis of their interaction with the contemplated design. (Knapp-USGS)
W73-11810

A FIELD INVESTIGATION OF ROLLOVER FISH PASS, BOLIVAR PENNINSULA, TEXAS,
Texas A and M Univ., College Station. Coastal and Ocean Engineering Div.
For primary bibliographic entry see Field 08B.
W73-11854

THE MOVEMENT OF PHOSPHOROUS IN THE LITTLE RIVER ESTUARY, NEW SOUTH WALES,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
For primary bibliographic entry see Field 05B.
W73-11912

GROWTH PER MOULT OF TAGGED LOBSTERS (HOMARUS AMERICANUS) IN BONAVISTA BAY, NEWFOUNDLAND,
Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 08I.
W73-11914

A DYNAMIC MODEL OF THE PHYTOPLANKTON POPULATION IN THE SACRAMENTO-SAN JOAQUIN DELTA,
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Programs.
For primary bibliographic entry see Field 05C.
W73-11937

FLOW AND CHEMICAL CHARACTERISTICS OF THE ST. JOHNS RIVER AT JACKSONVILLE, FLORIDA,
Geological Survey, Tallahassee, Fla.
W. Anderson, and D. A. Goolsby.
Geological Survey open-file report 73008, 1973. 105 p, 33 fig, 2 tab, 14 ref.

Descriptors: *Estuaries, *Florida, *Water balance, Salinity, Saline water intrusion, Evapotranspiration, Streamflow, Tides, Water chemistry.
Identifiers: *St. Johns River (Fla), Jacksonville (Fla).

The St. Johns River at Jacksonville, Florida, 21 miles upstream from the ocean, is part of a tidal estuary that extends to Lake George, 106 miles upstream from the ocean. Rising ocean tides at the mouth of the river force large amounts of water up the river past Jacksonville. Most of this water subsequently flows back past Jacksonville as the ocean tide falls. These tidal flows average 87,000 cubic feet per second at Jacksonville, and peak flows exceeding 150,000 cubic feet per second are common. The average tidal flows are more than seven times as large as the average net or freshwater flow. About a quarter of the freshwater that flows into the estuary from April through September is released to the ocean from October through March. When evapotranspiration from the estuary above Jacksonville exceeds rainfall and freshwater inflow into the estuary, the net loss of water tends to cause the volume and duration of the upstream flows to exceed those of the downstream flows. (Knapp-USGS)
W73-12030

THE GREAT MARSH, LEWES, DELAWARE--THE PHYSIOGRAPHY, CLASSIFICATION AND GEOLOGIC HISTORY OF A COASTAL MARSH,
Delaware Univ. Newark. Coll. of Marine Studies.
G. K. Elliott.
Available from NTIS, Springfield, Va 22151 as AD-756-637 Price $3.00 printed copy; $1.45 microfiche. Technical Report No 19, December 1972. 139 p, 10 fig, 1 tab, 42 ref, 5 append. ONR-GP Contract N00014-69-A0407.

Descriptors: *Marshes, *Tidal marshes, *Delaware, *Geomorphology, *Geologic history, Sediments, Geologic formations, Facies (Sedimentary), Sedimentology, Coasts, Salt marshes.
Identifiers: *Great Marsh (Del).

Subsurface investigation of the Great Marsh along the Delaware Bay Coast northeast of the town of Lewes indicates that the landward edge of the marsh represents the leading edge of the ongoing marine transgression. Associated with the marsh facies in this Holocene wedge are sediments of lagoonal-tidal creek facies and barrier facies. The spatial relation of these facies appears to be a function of the configuration of the transgression surface. Their distribution in time is a function of the rate of relative sea-level rise. Within the marsh facies three subfacies, back barrier, fringing, and broad, can be recognized on the basis of geologic setting and sediment texture. Observation of the major phanerogamic vegetation species, along with the composition of the marsh sediment, indicates that the marshes of lower Delaware are transitional between marshes of the New England type and those of the coastal plain type of the Eastern North American group. However, based on the relatively low organic content of the sediment and the lower growth position of Distichlis spicata relative to that of Spartina patens, these marshes demonstrate a stronger affinity to the coastal plain type. (Woodard-USGS)
W73-12033

CURRENTS IN THE SHORE ZONE OF A NON-TIDAL SEA (TECHENIYA BEREGOVOY ZONY BESPRILIVNOGO MORYA),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 02H.
W73-12060

HYDROLOGY OF THE PACIFIC OCEAN (GIDROLOGIYA TIKHOGO OKEANA).
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
Tikhiy okean, Vol II, Izdatel'stvo 'Nauka', Dobrovol'skiy, A. D., editor, Moscow, 1968. 524 p.

Descriptors: *Hydrology, *Pacific Ocean, *Sea water, *Water properties, Water structure, Water temperature, Salinity, Density stratification, Optical properties, Ocean circulation, Ocean currents, Ocean waves, Tides, Sea level, Sea ice, Mixing, Variability, Seasonal, Equations, Maps.
Identifiers: Geostrophic currents, Nomograms.

Volume II of the eight-volume series on the Pacific Ocean was prepared by the staff of the Department of Physical Oceanography of the USSR Academy of Science's Institute of Oceanology on the basis of research performed in 1958-64. Information is provided on properties of sea water (water structure, temperature, salinity, density, and ice formation), mixing, ocean circulation, seasonal variations of sea level, ocean waves and tides, and optical properties of water. An extensive bibliography of Soviet and foreign literature is supplied. (Josefson-USGS)
W73-12063

MOVEMENT AND QUALITY OF LONG ISLAND SOUND WATERS, 1971,
State Univ., of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 02K.
W73-12072

NEARSHORE CURRENTS AND THE EQUILIBRIUM CUSPATE SHORELINE,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 02J.
W73-12075

MAGNESIUM TO CHLORINITY RATIOS IN SEAWATER,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 02K.
W73-12086

DISTRIBUTION OF THE CLADOCERAN PODON POLYPHEMOIDES IN THE CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 05A.
W73-12152

DISTRIBUTION OF THE SALT MARSH SNAIL (MELAMPUS BIDENTATUS SAY) IN RELATION TO MARSH PLANTS IN THE POROPOTANK RIVER AREA, VIRGINIA,
Bureau of Sport Fisheries and Wildlife, Laurel, Md. Patuxent Wildlife Research Center.
J. A. Kerwin.
Chesapeake Sci. Vol 13, No 2, p 150-153. 1972. Illus.
Identifiers: Distichlis-Spicata-M, Distribution, Melampus-Bidentatus, Rivers, Spartina-Alterniflora-M, Spartina-Patens-M, *Virginia (Poroporatank River), *Marsh plants, *Snails (Salt marsh).

The distribution and abundance of M. bidentatus Say was related to the distribution of marsh plants within a Virginia estuary. The animal was found in association with 10 spp. of marsh phanerogams, occurring with 3 plant species more than 50% of the time. These plants were Distichlis spicata, Spartina patens, and the short form of S. alterniflora. Mean densities per square meter were 0.23 within the brackish-water marsh and 7.24 in the saltwater marsh. The snail was not obtained by sampling in fish and slightly brackish-water marsh communities.--Copyright 1972, Biological Abstracts, Inc.
W73-12164

THE VASCULAR FLORA OF ANNE ARUNDEL COUNTY, MARYLAND: AN ANNOTATED CHECKLIST,
Maryland Univ., College Park. Dept. of Botany.
M. T. Stieber.
Castanea. Vol 36, No 4, p 263-312. 1971.
Identifiers: Bays, Chesapeake Bay, Coastal plains, Deciduous woods, Ditches, *Estuaries, Flora, Forests, *Maryland (Anne Arundel Co.), Pastures, Pine-G, Species, *Vascular flora.

Anne Arundel County offers a variety of habitats on the Coastal Plain of Maryland in which plants can flourish and diversify. Its waterway boundaries include the saline Chesapeake Bay on the east and its many estuaries which extend far inland, including the Magothy, South, Severn, Patapsco, and Patuxent rivers. Brackish to freshwater swamps found along these estuaries provide a great deal of floral variety. Moist deciduous woods, as well as some dry sandy pine woods and gradations between the two, open pastures, roadsides and ditches all enhance the possibilities of a rich flora in the county. This study lists 876 spp. of vascular plants, which represent 117 families. The collections and annotations were made from the spring of 1966 through the summer of 1967. Further additions were made to the preliminary study during the summer of 1970.--Copyright 1972, Biological Abstracts, Inc.
W73-12170

A STUDY OF THE MARINE RESOURCES OF THE WAQUOIT BAY-EEL POND ESTUARY,
Massachusetts Dept. of Natural Resources, Boston.
J. R. Curley, R. P. Lawton, J. M. Hickey, and J. D. Fiske.
Mass Dep Nat Resour Div Mar Fish Monogr Ser. 9 p 1-40. 1971. Illus.

Identifiers: Bluefish, Crabs, Estuaries, Flounder, Marine resources, *Massachusetts, Ponds, Quahog, Trout, *Waquoit Bay-eel estuary, *Fish, *Shellfish.

Studies are presented on the extent and value of the marine resources of the major bays and estuaries in Massachusetts. These include available sportfish such as flounder, bluefish and salter trout; shellfish such as quahogs and clams, and blue claw crabs. Recommendations are made to aid in the management and wise utilization of these resources in the Waquoit Bay-Eel Pond estuary.--Copyright 1972, Biological Abstracts, Inc.
W73-12173

ENVIRONMENTAL LAW--EXPANDING THE DEFINITION OF PUBLIC TRUST USES,
For primary bibliographic entry see Field 06E.
W73-12211

LOUISIANA COASTAL COMMISSION.
For primary bibliographic entry see Field 06E.
W73-12217

THE QUALITY OF COASTAL WATERS: FIRST ANNUAL PROGRESS REPORT,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 05B.
W73-12295

BED FORMS OF THE MEDITERRANEAN UNDERCURRENT OBSERVED WITH SIDE-SCAN SONAR,
National Inst. of Oceanography, Wormley (England).
N. H. Kenyon, and R. H. Belderson.
Sedimentary Geology, Vol 9, No 2, p 77-99 May 1973. 19 fig, 27 ref.

Descriptors: *Sedimentary structures, *Bed load, *Bottom sediments, Continental shelf, Mud, Sands, Sand waves, Scour, Currents (Water), Sonar, Suspended load.
Identifiers: *Mediterranean Sea, *Gulf of Cadiz.

Details of bed forms beneath the Mediterranean undercurrent in the Gulf of Cadiz are depicted on side-scan sonar views to maximum slant ranges of 1 km, 7 km, and 14 km. A sequence of bed-form zones, largely comparable with that of strongly tidal continental-shelf seas, is found to depths of about 1400 m. This, with decreasing current velocity there are zones of scour hollows, sand ribbons, and sand waves, with related deposits. Beyond the sand-wave zone are smooth mud deposits where the undercurrent is in contact with the floor, and large, muddy sediment waves up to 40 m high where it is intermittently in contact with the bottom. These large, muddy-sediment waves are a bed form not found in the tidal-current environment, and are possibly formed by a combination of fall-out from suspension together with occasional bed movement as the base of the undercurrent fluctuates in depth. Variations in the bedding style in the deposits beneath the mud waves are visible on sub-bottom profiles. A stratigraphic boundary between an acoustically transparent layer, possibly representing pelagic sedimentation, and the overlying bedded sequence may define the age of commencement of the undercurrent. Flow paths, including several downslope trending channels, are influenced by gravity, Coriolis force, and topography. (Knapp-USGS)
W73-12300

THE DISTRIBUTION OF DISSOLVED MERCURY IN THE BRISTOL CHANNEL AND SEVERN ESTUARY,
Liverpool Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-12301

INTERSTITIAL WATER COMPOSITION IN BARATARIA BAY (LOUISIANA) SEDIMENT,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
C. L. Ho, and J. Lane.
Estuarine and Coastal Marine Science, Vol 1, No 2, p 125-135, April 1973. 7 fig, 3 tab, 13 ref.

Descriptors: *Pore water, *Water chemistry, *Bottom sediments, *Organic matter, *Estuaries, Louisiana, Nutrients, Nitrogen, Phosphorous, Phosphates, Productivity, Connate water, Sampling, Freezing.
Identifiers: *Barataria Bay (La).

In Barataria Bay, Louisiana, the interstitial water of John the Fool Bayou is influenced mainly by freshwater; that of Airplane Lake is influenced mainly by seawater. Sediments in the John the Fool Bayou are rich in organic matter, but those in Airplane Lake contain little organic matter. The temperature at which samples were stored exerted significant influence on the results obtained. Surface sediments stored at 4 deg C or on ice resulted in higher release of NH4 and SiO2 to interstitial water than samples stored immediately on dry ice. This was caused by decomposition of organic constituents. Surface sediments frozen immediately on dry ice resulted in higher release of free amino acids, N, P, and PO4 indicating lysis of living organisms. A one-year study of interstitial waters from surface sediments frozen immediately in the field showed that dissolved SiO2, NH4 and PO4 were higher from August through November than during other months. The yearly averages of these nutrients were many times higher than in the corresponding water columns in both areas. Free interstitial amino acids were higher in Airplane Lake sediments than in those of John the Fool Bayou. (Knapp-USGS)
W73-12302

COARSE-GRAINED SEDIMENTATION ON A BRAIDED OUTWASH FAN, NORTHEAST GULF OF ALASKA,
South Carolina Univ., Columbia. Dept. of Geology.
J. C. Boothroyd.
Available from NTIS, Springfield, Va 22151 as AD-759-068 Price $3.00 printed copy; $1.45 microfiche. Coastal Research Division Technical Report No 6-CRD, December 1972. 127 p, 46 fig, 1 tab, 56 ref. ONR N00014-67-A-0230-0001.

Descriptors: *Sediment transport, *Particle size, *Sedimentary structures, *Glacial drift, Alluvium, Alluvial channels, Gravels, Sands, Alaska, Braiding, Alluvial fans, Sedimentation, Sedimentology.
Identifiers: *Gulf of Alaska.

The Scott Glacier outwash fan, northeastern Gulf of Alaska, exhibits a systematic variation in slope (S), clast size, bar morphology, and sedimentary structures in a downstream direction. Slope decreases from 17.5 m/km to less than 2 m/km while clast size decreases from 30 cm to less than 3 cm in 12.5 km. Clast size may be used as an approximate indicator of regional slope. Sheet bars in the upper fan (S>10 m/km) are characterized by poorly sorted coarse gravel with crude bedding while longitudinal bars of the midfan (S<10 m/km) contain more abundant plane-bedded sand and planar crossbeds formed by bar-slipface migration. The clasts are primarily bladed to elongate in shape, well-imbricated, and display excellent long-axis orientations that are transverse to flow direction. Most bar deposition, especially on the upper fan, occurs during an annual flood, under upper flow regime conditions. High flow velocities (2-4 m/sec) are common even during declining flow. Significant large particle transport occurs during these floods. Deposition in channels, by megaripple migration forming festoon crossbeds, is an important process during falling water stages, especially on the lower midfan. The occurrence of large-scale crossbedding increases downstream. (Knapp-USGS)
W73-12307

SEDIMENT DISTRIBUTION IN SOUTHWESTERN DELAWARE BAY,
Delaware Univ., Newark. Coll. of Marine Studies.
R. N. Strom.
Available from NTIS, Springfield, Va 22151 AD-750-714 Price $3.00 printed copy; $1.495 microfiche. Technical Report No 18, July 1972. 118 p, 35 fig, 56 ref, 4 append. ONR Contract No N0014-69-A0407.

Descriptors: *Sedimentology, *Sediments, *Sediment distribution, *Bays, *Delaware, Data collections, Methodology, Sampling, Bathymetry, Surveys, Correlation analysis, Particle size, Sediment transport, X-ray diffraction, Cores.
Identifiers: *Delaware Bay.

Upward and landward migration of sedimentary environments during the Holocene marine transgression has resulted in complex sediment distribution patterns in southwestern Delaware Bay. Analyses of 'thin-skin' surface samples utilizing CM diagrams (Passega), sediment population analysis (Visher) and bathymetric relationships, indicate major processes contributing to the sedimentary distribution pattern: deposition from suspension in quiet water is occurring in Breakwater Harbor; well sorted sand deposits are being formed by the winnowing action of waves on top of the shoals in the open estuary in the northern portion of the study area; and strong tractive currents appear to be the dominant force controlling grain size distribution on The Shears, large shoal areas near the mouth of the Delaware Bay. Subsurface data indicate that the base of the Holocene transgression is in contact with at least two separate pre-Holocene units. The record of the upward and landward migration of laterally adjacent facies is only partially preserved beneath the sediment in the bay. Erosion of sediments deposited in barrier and back barrier environments occurs in a zone of abrasion in the nearshore region. (Woodard-USGS)
W73-12308

ENVIRONMENTAL GUIDE FOR THE U.S. GULF COAST,
National Climatic Center, Ashville, N.C.
For primary bibliographic entry see Field 06G.
W73-12310

NUMERICAL MODEL STUDIES OF THE ST. LAWRENCE RIVER,
National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering.
D. Prandle, and N. Crookshank.
Available from NTIS, Springfield, Va 22151 N73-10382 Price $7.75 copy; $1.45 microfiche. Report MH-109, July 1972. 104 p, 64 fig, 8 ref, 3 append.

Descriptors: *Tidal streams, *St. Lawrence River, *Tidal effects, *Channel morphology, *Model studies, Numerical analysis, Mathematical models, Analytical techniques, Water level fluctuations, Flow rates, Tides, Distance, Boundary processes, Sediment transport, Navigation.
Identifiers: Tidal time.

Tidal propagation in the St. Lawrence River was studied using three numerical models. For simulation of the entire 330-mile tidal reach a one-dimensional numerical model was used. A detailed investigation of a smaller section of the river was made using a two-dimensional model. This model was combined with the one-dimensional model to provide convenient boundary conditions. This technique was used also in studying the circulation of the lower estuary with a two-dimensional model. The simulation by the one-dimensional

model was considered sufficiently accurate for most engineering purposes being limited mainly by the accuracy of the available field data. The simulation by the two-dimensional models was of an equivalent degree of accuracy except in those areas where marked vertical stratification occurred. The models will be used to provide input for other studies such as sediment-transport and dispersion investigations. (Woodard-USGS)
W73-12313

RHODE ISLAND MARINE BIBLIOGRAPHY.
Rhode Island Univ., Kingston. Coastal Resources Center.

Available from NTIS, Springfield, Va 22151 as COM73-10227 Price $3.00 printed copy; $1.45 microfiche. Marine Technical Report No 3, 1972. 192 p, 1 fig.

Descriptors: *Bibliographies, *Coasts, *Oceanography, *Rhode Island, Publications, Documentation, Water quality, Salinity, Estuaries, Sounds, Bays, Islands, Marine biology, Marine animals, Water resources, Aquatic life, Beach erosion, Tides, Coastal engineering, Recreation facilities, Indexing, Information retrieval, Hydrologic data, Computer programs.
Identifiers: *Marine bibliography (R I).

The Rhode Island Marine Bibliography was first published in January 1966 as the Rhode Island Marine Bibliography and Atlas Part I Bibliography--Preliminary Draft. This revised bibliography is the first of a series of tools to be utilized in the development of a comprehensive coastal resources management plan. The geographic area covered is defined by a line from the Connecticut border through Fishers Island and Plum Island to Orient Point, then to Gardiners Island, Montauk Point, Block Island, Nomans Land, Gay Head, Cuttyhunk Island and the Rhode Island-Massachusetts border. All citations in the original bibliography have been checked. An effort has been made to obtain copies of all cited documents and ascertain their relevance to the defined area. These citations have been completed, coded and punched; document numbers have been assigned and filed. Over 700 references are cited. (Woodard-USGS)
W73-12316

DISPOSITION OF SPOIL ON THE DUMP SITE,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 05E.
W73-12318

SEDIMENTS OF THE DREDGING AND DISPOSAL AREAS,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 05E.
W73-12319

CHARACTERISTICS OF THE PHYSICAL ENVIRONMENT,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 05E.
W73-12320

A FEN ON THE NORTHERN CALIFORNIA COAST,
California Univ., Berkeley. Dept. of Botany.
H. G. Baker.
Madrono. Vol 21, No 6, p 405-416. 1972. Illus.
Identifiers: Acid waters, Alaska, *California (Inglenook Fen), Chemical analyses, Coasts, Conservation, Dunes, Hydrosere, Menyanthes-Trifoliata-Conifer-G, Sand, Shell-rich sand dunes, Soils, Waters, Yuki Indians, *Fens, *Menyanthaceae.

Inglenook Fen is situated on the Mendocino County coast of California, nearly at sea-level. It is produced by the impounding of acid waters draining from regional coniferous forest by shell-rich sand-dunes advancing over an uplifted marine terrace. A hydrosere from open water, through fen proper, to fen-carr, and coniferous forest is described together with chemical analyses of waters and soils. Comparison is made with other coastal fens reaching as far north as Alaska, but Inglenook Fen appears to be the southernmost extant example. Previously-existing fens at Point Reyes and at San Francisco are postulated. Menyanthes trifoliata (Menyanthaceae) has its only known lowland occurrence in California here, possibly representing a persistence from the Pleistocene. Associations with extinct Coast Yuki Indians and ecological uniqueness make it important that this fen be conserved.--Copyright 1972, Biological Abstracts, Inc.
W73-12350

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

ORANGE COUNTY WATER DISTRICT'S WATER FACTORY 21,
Orange County Water District, Santa Ana, Calif.
For primary bibliographic entry see Field 05D.
W73-11719

THE ALUMINA-LIME SODA WATER TREATMENT PROCESS,
Midwest Research Inst., Kansas City, Mo.
J. W. Nebgen, E. P. Shea, and S. Y. Chiu.
Available from the National Technical Information Service as PB-218 326, $3.00 in papercopy, $1.45 microfiche. Office of Saline Water, Research and Development Progress Report No 820, January 1973. 68 p. Contract 14-30-2935.

Descriptors: *Desalination process, *Water softening, Brackish water, *Chemical precipitation, Waste water treatment.
Identifiers: *Alumina-Lime-Soda Process, *Chemical Pretreatment.

A new pretreatment process for brackish water desalting has been developed and evaluated in the laboratory. The alumina-lime-soda process involves treating raw saline water with sodium aluminate and lime, separating precipitated solids, and neutralizing the separated effluent with carbon dioxide. The water recovered after the carbon dioxide neutralization is feedwater to a desalting process. The sodium aluminate treatment precipitates a calcium sulfoaluminate. Both hardness cation and sulfate anion are removed simultaneously. Therefore, the feedwater is softened and reduced in total salinity. In addition to hardness and sulfate the sodium aluminate-lime treatment also removes boron, silica, iron and manganese. This process is more efficient in removing hardness than conventional lime-soda ash treatment. (OSW)
W73-11748

FINAL DISPOSAL OF EFFLUENT BRINES FROM INLAND DESALTING PLANTS,
Dow Chemical Co., Freeport Tex.
For primary bibliographic entry see Field 05E.
W73-11749

ICE CRYSTALLIZATION STUDIES IN FREEZE DESALINATORS,
Rocketdyne, Canoga Park, Calif.
G. R. Schneider.
Available from the National Technical Information Service as PB-219 253, $3.00 in paper copy, $1.45 microfiche. Office of Saline Water, Research and Development Progress Report No 838, March 1973. 72 p, 5 tab, 28 fig, 9 ref. 14-30-3000.

Descriptors: *Desalination, *Freezing, *Ice crystallization, Nucleation, *Desalination.
Identifiers: Particle size analyzer, Crystal growth, Secondary nucleation, Supercooling, Crystallizer.

Measurements of the ice particle growth velocity and secondary nucleation rate in well-stirred ice-brine suspensions were obtained using the particle size distribution and an analysis of the brine temperature-time record. Size distribution was determined via an automatic particle size analyzer. Growth velocity was found to be directly proportional to supercooling and to decrease with increasing salt concentration. The results are best fitted by a process controlled by the rate of heat and mass transfer. The secondary nucleation rate was determined as a function of supercooling up to 0.706C, for salt concentrations of 20 and 60 gm NaCl/liter H2O, and at mixing powers ranging from 1.9 to 12.5 cal/liter/min. Data on the effect of a soft silicone-rubber-coated impeller on nucleation rate are also presented. (OSW)
W73-11750

SCALE INHIBITION BY ORGANIC ELECTRODEPOSITION,
Tyco Labs, Inc., Waltham, Mass.
For primary bibliographic entry see Field 08G.
W73-11751

FREEZING PROCESS STUDIES: BUTANE STRIPPING IN SPRAYS AND EVAPORATION OF BUTANE DROPS,
Syracuse Univ., N.Y. Dept. of Chemical Engineering and Materials Science.
Y-S. Cheng, R. Nene, P. A. Rice, and A. J. Barduhn.
Available from the National Technical Information Service as PB-218 561, $3.00 in paper copy;, $1.45 in microfiche. Office of Saline Water, Research and Development Progress Report No 823, November 1972. 20 p, 7 fig, 2 tab, 21 ref. 14-30-2578.

Descriptors: *Desalination, *Crystallization, *Freezing, *Ice, Evaporation.
Identifiers: *Butane, Vacuum stripping, Weber number.

Rates of butane removed from water in a vacuum spray chamber have been measured for different chamber pressures, spray velocities and at two nozzle heights. The number of overall transfer units for a given nozzle height correlates well with the Weber number for all the pressures and flow velocities measured. The number of overall liquid transfer units increases from one and one-half to four as the Weber number increases from 0.02 to 0.4. The data at two different nozzle heights indicate that most of the mass transfer is taking place in the liquid sheet attached to the nozzle orifice and not in the spray itself. A unique apparatus also has been designed and constructed which permits an evaporating butane drop to suspend in a flow stream of water. The external phase (water) turbulence levels surrounding the evaporating drop simulate much more closely the conditions encountered by an evaporating drop in an actual butane freezer, than either the rising drop or suspended drop apparatuses used previously. (OSW)
W73-11752

SEARCH FOR NEW DESALINATION MEMBRANES,
State Univ. of New York, Syracuse. Coll. Environmental Science and Forestry.
S. Mukherjee, and P. Luner.
Available from the National Technical Information Service as PB-218 559, $3.00 in paper copy,

$1.45 in microfiche. Office of Saline Water Research, and Development Progress Report No 826, November 1972. 8 p, 3 tab, 2 fig, 8 ref. 14-01-0001-1263.

Descriptors: *Reverse osmosis, *Desalination, *Membranes.
Identifiers: *Chitin, *Chitosan, *Acetylation, Polymeric properties, Moisture content, Film preparation.

Chitin has been deacetylated to produce chitosan. Chitosan salt film have been cast from dilute acetic acid solvent and free amine films have been generated by an alkali coagulation technique. The water content of these films and coagulated membranes is high, and this makes them unsuitable for being used as desalination membranes. Heat treatment on these films in the temperature range 50-150C did not improve the properties. Chitin and chitosan have been acetylated using a number of procedures. It is concluded that the method using anhydrous hydrogen chloride is the best and leads to a product from which films can be made. Chitosan seems to be N-acetylated to form products similar to chitin. Only poor films were prepared by casting from 99% formic acid at room temperature. (OSW)
W73-11753

THE INFLUENCE OF SURFACES ON THE STRUCTURE OF WATER,
North American Rockwell Corp., Canoga Park, Calif.
For primary bibliographic entry see Field 01B.
W73-11754

DIFFERENTIAL SCANNING CALORIMETRY OF CELLULOSE ACETATE,
State Univ. of New York, Syracuse. Coll. of Environmental Science and Forestry.
B. Kokta, P. Luner, and R. Suen.
Available from the National Technical Information Service as PB-218 562, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 829, November 1972. 16 p, 9 fig, 2 tab, 14 ref. 14-01-0001-1263.

Descriptors: *Desalination, *Reverse osmosis, *Membranes, Cellulose, *Heats of fusion, *Melting points, Crystallinity.
Identifiers: Differential scanning calorimetry, Asymmetric membranes, Dense films, *Cellulose acetate.

The melting temperatures and heats of fusion have been determined for cellulose acetate (2.5) in the form of a powder, dense film, ultra-thin film, and reverse osmosis membrane. The main melting temperatures were in the range of 230C + 2C although often a secondary peak was located at 217 plus or minus 2C. Powdered samples showed broad melting peaks with low heats of fusion. Higher heats of fusion and sharper peaks were obtained from films prepared by the 'dipping' technique. Varying the sample techniques did not change the values for the heats of fusion. Still higher heats of fusion were obtained when the cellulose acetate (2.5) was cast from acetone. Some increase in the heats of fusion resulted when the latter samples were heat treated at 85C. The heats of fusion of commercial membranes were independent of the reverse osmosis properties. It is suggested that the rejection layer of Loeb-type membranes has the same degree of crystallinity as the porous substrate. (OSW)
W73-11755

MONOMOLECULAR FILM PROPERTIES OF CELLULOSE AND AMYLOSE TRIACETATES AT THE AIR-WATER INTERFACE,
State Univ. of New York, Syracuse. Coll. of Environmental Science and Forestry.
M. Hittmeier, L. S. Sandell, and P. Luner.
Available from the National Technical Information Service as PB-218 555, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water, Research and Development Progress Report No 827, November 1972. 18 p, 7 fig, 2 tab, 32 ref.

Descriptors: *Reverse osmosis, *Desalination, Cellulose, *Surface pressure, Compressibility, *Hysteresis.
Identifiers: Amylose diacetate, Pyranose rings, Wilhelmy film balance, Limiting areas, Pressure-area isotherms, *Cellulose triacetate, Langmuir film balance.

Surface pressure-area isotherms of cellulose triacetate and amylose triacetate at the air-water interface were determined on a vertical and horizontal film balance. Both polymers show anomalous behavior on the vertical balance, including: higher compressibilities than obtained on the horizontal balance, movement of the vertical plate, and atypical hysteresis of the isotherms. The behavior of the cellulose triacetate film is attributed to heterogeneous gelation of the monolayer at low pressure. A mechanism involving the lateral tilting of pyranose units at the interface and subsequent stabilization of the monolayer by van der Waal's interactions accounts for the properties of this film. A helical conformation for anylose triacetate at the air-water interface is proposed to explain the low compressibility of this monolayer. (OSW)
W73-11756

IONIC BLOCK COPOLYMERS AS PIEZODIALYSIS MEMBRANES,
Shell Development Co., Emeryville, Calif.
G. Lopatin, H. A. Newey, and O. D. Bergren.
Available from the National Technical Information Service as PB-218 552, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water, Research and Development Progress Report No 824, January 1973. 42 p, 3 tab, 16 fig, 8 ref. 14-30-2809.

Descriptors: *Desalination, *Membrane processes, *Dialysis, *Permselective membranes, *Ion transport.
Identifiers: *Piezodialysis, Charge mosaic membranes, ABA block copolymers, Anionic membranes, Cationic membranes.

The effects of different process variables on the salt transport and solution flux of charge mosaic membranes with respect to piezodialysis were evaluated. Also the development of techniques to construct fine grained charged mosaic films for use as piezodialysis membranes were carried out. Charge mosaic membranes of a type with a well defined and controlled geometry were used to test the effects of temperature, pressure, concentration, thickness ratio, and anionic exhange capaicty on the salt and solution transport properties of the membranes. Techniques for obtaining proper particle distribution, film casting, film forming, abrasion and testing for leaks were developed. Fine grained charge mosiac membranes with high particle exposure at the membrane surfaces were prepared and tested but no noteworthy piezodialysis activity was observed for these membranes. The work has shown though that composite membranes can be constructed using the special properties of the ionic ABA block copolymers as matrix. (OSW)
W73-11757

DIFFUSION OF SODIUM CHLORIDE IN CELLULOSE AND AMYLOSE ACETATES,
State Univ. of New York, Syracuse. Coll. of Environmental Science and Forestry.
M. Barnes, C. Skaar, and P. Luner.
Availble from the National Technical Information Service as PB-218 556, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 825, November 1972. 9 p, 1 tab, 3 fig, 5 ref. 14-01-0001-1263.

Descriptors: *Desalination, *Reverse osmosis, *Membranes, *Diffusion, *Cellulose acetate, Permeability.
Identifiers: Amylose diacetate, Sodium chlroide diffusion, Salt permeability.

A method for measuring the resistance change of a film with time was used to determine the diffusion and apparent permeability coefficients of sodium chlorides in the two polymeric films. The results with cellulose diacetate (CDA, 39.8% acetyl) were comparable to previous results, including reverse osmosis. Amylose diacetate (ADA, 41.2% acetyl) was shown to have a lower diffusion coefficient and apparent permeability to sodium chloride than the CDA films. Heating ADA films greatly reduced the derived coefficients. These results are accounted for on the basis of the ease of crystallization of amylose acetate. (OSW)
W73-11758

WATER DIFFUSION THROUGH CELLULOSE AND AMYLOSE ACETATES,
State Univ. of New York, Syracuse. Coll. of Environmental Science and Forestry.
M. Barnes, C. Skaar, and P. Luner.
Available from the National Technical Information Service as PB-218 557, $3.00 in paper copy; $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 831, November 1972. 32 p, 5 tab, 15 fig, 26 ref. 14-01-0001-1263.

Descriptors: *Desalination, *Membranes, Cellulose, *Diffusion, *Crystallization, *Vapor pressure, X-ray diffraction.
Identifiers: *Amylose acetate, Permeability coefficient, Diffusion coefficient, Film thickness, Polymer crystallinity, *Cellulose acetate.

The transport of water through untreated and heated cellulose diacetate membranes and films and through amylose diacetate films was studied at 25C by means of both steady-state and unsteady-state methods. The coefficients obtained by steady-state measurements were confined to the high water vapor activity regions near 0.95 using an inverted cup technique in which one surface of the film was in contact with salt solutions and the opposite surface to air of 0.95 relative vapor pressure. The unsteady state measurements were made in small steps over the range from 0.1 to 0.9 relative vapor pressure for comparison with the steady-state results. The permeability and diffusion coefficients obtained by both techniques increased with increasing film thickness, and the 'true' diffusion coefficients was calculated where possible by correcting for film thickness. The diffusion coefficients obtained by the steady-state method were one or two order of magnitude larger than the unsteady-state coefficients extrapolated to 0.95 relative vapor pressure. The latter coefficients decreased exponentially with increasing mean relative vapor pressure. The steady-state permeability and diffusion coefficients for untreated cellulose diacetates were of the same order of magnitude. Heating reduced the coefficients for the cellulose diacetate films but not those of amylose diacetate. (OSW)
W73-11759

WATER VAPOR SORPTION IN CELLULOSE AND AMYLOSE ACETATES,
State Univ. of New York, Syracuse. Coll. of Environmental Science and Forestry.
M. Barnes, C. Skaar, and P. Luner.
Available from the National Technical Information Service as PB-218 558, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 832, November 1972. 25 p, 10 fig, 2 tab, 30 ref. 14-01-0001-1263.

Descriptors: *Reverse osmosis, *Desalination, Cellulose, *Water of hydration, *Sorption.

Identifiers: *Cellulose acetate, *Amylose Acetate, Sorption isotherms, Hailwood-horrobin Theory, Zimm-Lundberg Theory, B.E.T. curves, Clustering Theory.

The experimental water absorption isotherms were discussed in terms of three theories: B.E.T., Hailwood-Horrobin, and Zimm-Lundberg. The Hailwood-Horrobin theory was shown to fit the sorption isotherm throughout most of the relative vapor pressure region while the B.E.T. theory fitted the experimental isotherm up to 0.6 relative vapor pressure. Heating cellulose acetate was shown to have little effect on sorption, but increasing the acetyl content reduced both the hydrated or surface bound water and the water of solution. Amylose acetate sorbed less of both hydrated water and water of solution, and heating reduced the water of solution considerably. This was attributed to a higher degree of ordering, i.e., crystallinity, resulting in a decreased availability of sorption sites and surface area in the amylose polymers. Clustering in all polymers was shown by evaluation of the Zimm-Lundberg cluster function. Heating cellulose acetate or increasing the acetyl contact yielded some initial clustering. Clustering was lower in the amylose acetates. (OSW)
W73-11760

REVERSE OSMOSIS STUDIES OF CELLULOSE AND AMYLOSE ACETATES,
State Univ. of New York, Syracuse. Coll. of Environmental Science and Forestry.
W. W. Carey, and P. Luner.
Available from the National Technical Information Service as PB-218 563, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water Research and Development Progress Report No 828, November 1972. 18 p, 3 tab, 6 fig, 11 ref. 14-01-0001-1263.

Descriptors: *Desalination, *Reverse osmosis, *Membranes, Cellulose, *Salt rejection, Permeability.
Identifiers: Amylose acetate, Salt diffusion, Water vapor permeability, *Cellulose acetate, *Cellulose triacetate.

Short-term reverse osmosis experiments were made on thin films of cellulose diacetate, triacetate, and amylose diacetate. These experimentally determined salt rejection values were compared to those computed from experimental values for D1C1 and D2K determined by water vapor permeability and salt diffusion. The experimental relationship between water and salt permeability is discussed in terms of the effect of changes in these parameters with changes in operating pressure, feed concentration, and required salt rejection. (OSW)
W73-11761

APPARATUS FOR THE SEPARATION OF IONS FROM SOLUTION,
D. D. Ustick.
U.S. Patent No 3,719,583, 4 p, 6 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 908, No 1, p 169, March 6, 1973.

Descriptors: *Patents, Sea water, *Desalination, *Demineralization, *Electrolytes, Equipment, Potable water, *Ions, Sodium chloride, Salt water, Separation techniques, Ion transport.
Identifiers: Ion separation, Deionized water.

An ionized solution or electrolyte, such as sea water, is caused to flow through a conduit while passing through a magnetic field produced between magnets of opposite polarity disposed in spaced relationship adjacent opposite wall portions of the conduit. Extending between these magnets are two spaced opposite conduit wall portions of electrically non-conducting porous material, such as porous ceramic material, through the pores of which the positive and negative ions in a solution such as sea water can pass. When subjected to the magnetic field extending between the magnets, the positive and negative ions are deflected laterally away from each other in opposite directions toward the porous walls, and are expelled from the conduit through the pores. The opposite but approximately parallel flow of positive and negative ions through this transverse magnetic field generates an electric current density, a very large percentage of which passes through the faces of the conduit's porous walls. The magnitude of the current density flowing out from the pores of the conduit and into the external medium is a measure of the relative concentration of salt water undergoing desalinization by passing constituent ions (in this case from a salt water solution) through the conduit. If there is no measurable current density at a station downstream along the conduit adjacent the external side of its porous walls, the deionized water leaving the outlet orifice of the conduit is essentially free from salts. (Sinha-OEIS)
W73-11871

MULTI-STAGE FLASH EVAPORATOR FOR DISTILLING BRINES,
Riley-Beaird, Inc., Chicago, Ill. (assignee)
V. W. Kowalski.
U.S. Patent No 3,730,848, 4 p, 3 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 910, No 1, p 282, May 1, 1973.

Descriptors: *Patents, *Desalination, *Distillation, Brines, Sea water, Salt water, Potable water, *Water treatment, Separation techniques, Equipment, Condensers, *Flash distillation, Evaporators.

This apparatus has two flash stages connected in series and condensing stages situated between them. In this arrangement vapor and distillate flow countercurrent to infeed. The configuration of the evaporator eliminates hot walls which result in the buildup of salt deposits. The elimination of hot areas is achieved by placing the condensing stages between the evaporator stages. This permits further utilization of the infeed to maintain the flash chambers in a temperature condition which while high enough to accomplish flashing is still sufficiently low to prevent salting out and collection of such salt on the walls of the flash stages. (Sinha-OEIS)
W73-11877

WATER PURIFICATION,
Texaco, Inc., New York. (assignee)
For primary bibliographic entry see Field 05F.
W73-11896

BENEFITED WATER DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-11988

POLY (N-AMIDO)IMIDES AS SEMIPERMEABLE MEMBRANES,
Office of Saline Water, Washington, D.C.
W. J. Wrasidlo.
Available from NTIS, Springfield, Va 22151 as PB-215 274 Price $3.00 printed copy; $1.45 microfiche. Department of the Interior Patent Application Docket No SAL-1990 (Serial No 316,935), December 20, 1972. 10 p, 2 tab.

Descriptors: *Reverse osmosis, *Semipermeable membranes, *Patents, *Desalination apparatus, Equipment, Water treatment.
Identifiers: Poly (N-amido)imides.

Semipermeable membranes may be prepared from poly (N-amido)imides. Semipermeable membranes consisting essentially of poly (N-amido)imides exhibit superior salt rejection and water flux in reverse osmosis processes. Preparation involves initial reaction of a tetracarboxylic acid dianhydride with an amido-hydrazide to form a polyamic acid, and subsequent dehydration to form the corresponding poly (N-amido)imide. Suitable supports are those conventionally employed in reverse osmosis processes. (Knapp-USGS)
W73-12036

DESALTING IN THE ARID REGIONS,
Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
R. F. Probstein, and J. M. Alvarez.
Presented at Science and Man in the Americas, AAAS/CONACYT meeting, Mexico City, Deserts and Arid Lands Symposium, June 25-27, 1973. 38 p. 46 ref.

Descriptors: *Desalination processes, *Brackish water, *Reverse osmosis, *Electrodialysis, *Ion exchange, Municipal water, Water costs, Water resources development, South America, Mexico, United States, Southwest U.S., Salinity, Priorities, Hydrologic data, Water supply.

Various desalting processes are outlined, with emphasis on those appropriate for treatment of brackish water. Locations, quantity and quality of brackish water resources in the arid regions of the Americas are detailed, with recommendations for priorities in development for municipal supplies, after certain steps necessary to implementation are taken, such as inventories of brackish water resources, establishment of desalting test stations, and r and d programs in desalination. Desalting methods for brackish water suggested are reverse osmosis, electrodialysis, ion exchange, and ion exchange in combination with either of the first two methods. All offer a relatively high degree of operational simplicity. Reported locations and quality of brackish surface and groundwaters in the arid regions of the U.S., Mexico, and South America are shown by a series of maps. However, much charting of the saline supplies remains to be done, particularly in South America. Nevertheless, considerable quantities of low salinity brackish water are known in the dry and water-short regions of the western hemisphere. The economic prospects of desalting for irrigation do not look favorable, but a much more optimistic picture emerges especially in the U.S., with respect to desalting for municipal supplies and certain industrial and mining needs. Appendices contain detailed information on specific known areas of brackish water resources in the U.S., Mexico, Brazil, Peru, Chile, and Argentina. (Paylore-Arizona)
W73-12244

GEOTHERMAL RESOURCES AS A SOURCE OF WATER SUPPLY,
Bureau of Reclamation, Washington, D.C.
J. J. O'Brien.
Journal of the American Water Works Association, Vol 64, No 11, p 694-700, November 1972. 4 fig, 1 map, 1 illus, 1 photo, 3 tab, 3 ref.

Descriptors: *Geothermal studies, *Water supply, *Desalination, Subsidence, Economic feasibility, Costs, Colorado River, Chemical engineering, Salinity, Powerplants, Water resources development, Water costs, Desalination processes, Water temperature, Hot springs, Brines, Planning, Water utilization, Saline water.
Identifiers: *Geothermal investigations, Geothermal resources, Imperial Valley (Calif).

The quantity and quality of water flowing in the Colorado River is not adequate for the demands being made; therefore, the Colorado River Basin Act of 1968 directed the Secretary of the Interior to explore alternatives for increasing the annual river flow by 2.5 million acre-ft. The Bureau of Reclamation (USBR) and Office of Saline Water (OSW) are involved in determining the engineering

and economic feasibility of obtaining freshwater by desalting geothermal brines underlying the Imperial Valley of California. In the initial investigation, 9 shallow test holes were drilled and indicated a major geothermal resource underlies an area called the Mesa Anomaly. A deeper test-production well with a projected depth of 6,500 ft is being drilled. If further investigative stages are approved, a multipurpose development is envisioned whereby USBR and OSW would develop the water resource and nonfederal interests would develop the power-generation and mineral-recovery efforts. Problems considered include: (1) desalting of the geothermal brines having high temperatures (over 350 deg F) and chemical concentration, (2) reinjecting fluids to replace removed geothermal brines (to avoid surface subsidence), and (3) costs of developing a full size project. (USBR)
W73-12333

3B. Water Yield Improvement

RESEARCH IN THE DEVELOPMENT AND UTILIZATION OF ATMOSPHERIC WATER RESOURCES IN MONTANA,
Montana State Univ., Bozeman. Dept. of Earth Sciences.
R. H. Yaw.
Available from the National Technical Information Service as PB-222 004, $3.00 in paper copy, $1.45 in microfiche. Montana University Water Resources Research Center Research Report No 37, 1973. 9 p, 14 append. OWRR A-062-MONT (1).

Descriptors: *Weather modification, *Meteoric water, *Education, *Cloud physics.
Identifiers: *Cloud seeding, *Public relations, *Meteorological.

In the spring of 1972, researchers at Montana State University recognized that intense activity was in progress in several western states to develop and use weather modification techniques to increase growing season precipitation. In Montana, lack of public knowledge and awareness, in combination with a state law which inhibited cooperative research, was minimizing opportunities for the accumulation of factual knowledge of potential value to residents of the state. This research and information program resulted in (1) a greatly increased awareness of weather modification and the need for research in Montana, (2) changes to the state weather modification law, (3) the availability of $100,000.00 for a cooperative state-federal research program, and (4) awareness in theMontana Congressional Delegation of local interests and desires.
W73-11712

UTILIZATION OF GROUND WATER RESOURCES.
For primary bibliographic entry see Field 06E.
W73-11971

WATER QUALITY COMMISSION.
For primary bibliographic entry see Field 06E.
W73-11991

JACKSON-BIENVILLE PARISHES DUGDEMONA WATERSHED DISTRICT.
For primary bibliographic entry see Field 06E.
W73-11995

GREATER BATON ROUGE WATER CONSERVATION DISTRICT.
For primary bibliographic entry see Field 06E.
W73-11996

WATER-BUDGET STUDIES OF LOWER MESILLA VALLEY AND EL PASO VALLEY, EL PASO COUNTY, TEXAS.,
Geological Survey, El Paso, Tex.
For primary bibliographic entry see Field 02A.
W73-12022

3C. Use of Water of Impaired Quality

WATER REUSE, A BIBLIOGRAPHY, VOLUME 1.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 05D.
W73-11701

WATER REUSE, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 05D.
W73-11702

3D. Conservation in Domestic and Municipal Use

CURRENT WATER USE REQUIREMENTS IN THE QU'APPELLE RIVER BASIN,
Saskatchewan Water Resources Commission, Regina. Investigation and Planning Branch.
For primary bibliographic entry see Field 06D.
W73-12232

REPORT ON WATER SUPPLY STUDY OF CERTAIN URBAN COMMUNITIES IN THE QU'APPELLE RIVER BASIN.
Saskatchewan Water Resources Commission, Regina. Water Rights Branch.
For primary bibliographic entry see Field 06D.
W73-12233

CONSENSUS: THE FIRST STEP,
Northeastern Illinois Planning Commission, Chicago.
For primary bibliographic entry see Field 06F.
W73-12234

A PROPOSAL FOR A MODEL RIVER PROJECT CONCERNING 'RIVERFRONT BEAUTIFICATION AND UTILIZATION IN METROPOLITAN AREAS.'
Omaha-Council Bluffs Riverfront Development Committee, Nebr.
For primary bibliographic entry see Field 06B.
W73-12235

3E. Conservation in Industry

CURRENT WATER USE REQUIREMENTS IN THE QU'APPELLE RIVER BASIN,
Saskatchewan Water Resources Commission, Regina. Investigation and Planning Branch.
For primary bibliographic entry see Field 06D.
W73-12232

3F. Conservation in Agriculture

SOIL MOISTURE EXTRACTION AND IRRIGATION DESIGN REQUIREMENTS FOR CORN,
Nebraska Univ., Lincoln.
P. E. Fischbach, and B. R. Somerhalder.
Paper 72-770, 1972 Annual Meeting American Society of Agricultural Engineers, Chicago, Illinois, Dec 1972. 15 p, 2 fig, 5 tab, 7 ref.

Descriptors: *Water requirements, *Corn (Field), *Irrigation design, *Sprinkler irrigation, Soil moisture, Root zone, Moisture content, Soil-water-plant relationships, Irrigation systems, Automatic control, Design criteria, Rainfall, On-site investigations, Consumptive use, Crop production.
Identifiers: Moisture sensors, Silty loams.

With today's automated equipment, irrigation can be a matter of pressing a button to place a system into operation. However, water must be efficiently applied and rainfall effectively utilized to minimize water waste and to produce high crop yields. To determine the amount of water required to produce the highest corn yield, in 1971-72, field studies were conducted at the University of Nebraska Field Laboratory. Irrigation frequencies of 1.5, 3.0, 3.5, and 7 days applying water in the amounts of 0.30, 0.24, 0.15, and 0.10 in./day design criteria equivalent were studied on Sharpsburg silty clay loam soil. Soil moisture was at field capacity to a depth of 5 ft when corn was planted on all treatments. Soil moisture extraction patterns were monitored on corn for each of the different frequencies and amounts of water applied on each treatment. Design criteria for irrigation system capacity were calculated to apply the different amounts of water. Irrigation frequencies studied did not affect corn yields or change soil moisture extraction patterns. Yields averaged 8 bushels/acre greater on treatments where 0.15 in./day design criteria equivalent was applied, regardless of irrigation frequency. (USBR)
W73-11727

DETERMINING IRRIGATION POTENTIAL - A COMPUTER MODEL,
G. L. Nimmer, and G. D. Bubenzer.
Paper 72-726, 1972 Winter Meeting American Society of Agricultural Engineers, Chicago, Illinois, Dec 1972. 15 p, 2 fig, 1 tab, 19 ref.

Descriptors: *Water requirements, *Water distribution (Applied), Computer models, Irrigation, Irrigation efficiency, Irrigation effects, Irrigation programs, Irrigation systems, Soils, Water supply, Crops, Management, Evapotranspiration, Bibliographies, Climate, Wisconsin, Soil properties, Agronomy, Planning, Data storage and retrieval.
Identifiers: *Irrigation requirements.

A computer model was developed to provide irrigators with the irrigation requirements for a crop-soil-management system. In the State of Wisconsin, a complete data bank of irrigation parameters and a method of data retrieval were developed for crops, soils, climate, and water supply. Data bank components discussed are: (1) evapotranspiration rates, (2) crop coefficients, (3) soil characteristics, (4) precipitation, and (5) ground-water supply. Output from the computer program may be divided into 3 sections: (1) input data in both original and coded form, and information from the data storage bank related to input data; (2) results obtained from the water balance, such as weekly values of crop coefficients, evapotranspiration, and total and effective precipitation; and (3) summary of irrigation design parameters used throughout the program. Analysis of preliminary tests indicate general agreement with observed irrigation requirements on sandy soils. Little data are available for comparisons on organic and medium textured soils in Wisconsin; however, results obtained appear to agree with current irrigation preactices on these soils. (USBR)
W73-11734

SIDE ROLL SPRINKLERS,
Miller (Marion) and Associates, Inc., Colorado Springs, Colo.
M. Miller.
Irrigation Age, Vol 7, No 6, p 24-25, 62, 65, January 1973. 3 photo, 1 tab.

Descriptors: *Irrigation, *Sprinkler irrigation, *Irrigation systems, Irrigation operation and maintenance, Irrigation efficiency, Irrigation practices, Surface irrigation, Water distribution (Applied), Aluminum, Farm management, Pipes, Agricultural engineering.

The side roll sprinkler is the first successful attempt to mechanize the conventional hand move system. This system can be used on any size rectangular-shaped farm where low to medium height crops are grown. Development of the system and the present approach to the wheel and coupler attachments are described. In 90% of the systems, the wheels are connected to the middle of a pipe length and a coupler, incorporating a riser and drain, connects the pipe lengths. Components used in the present side roll system are: different sizes of aluminum pipes, couplers, wheels, power movers, self-alining risers, and drains. From the standpoint of water distribution, the most popular system is 1/4 mi long, with a sprinkler every length of pipe. Factors to be considered when purchasing a side roll system and recommended operating procedures are presented. (USBR)
W73-11737

FARMING CIRCLES,
Colorado State Univ., Fort Collins.
D. L. Miles.
Irrigation Age, Vol 7, No 6, p 20-21, 48, 53, 56, January 1973. 1 photo.

Descriptors: *Irrigation, *Sprinkler irrigation, Irrigation operation and maintenance, *Irrigation efficiency, Irrigation practices, Irrigation systems, Surface irrigation, Water distribution (Applied), Agricultural engineering, Farm management, Water requirements, Crop response, Planting management.
Identifiers: Irrigation requirement, Cropping patterns.

Circular farming with elimination of end guns, running wheels on ridges, and smoothing the surfaces are procedures that increase the potential profit of center-pivot irrigation farming. For a typical 132-acre system, the elimination of end guns will reduce the irrigated acreage to 122 acres. However, the uniformity of irrigation will usually result in more total yield than from the 132 acres without having to till, plant, fertilize, irrigate, and harvest the additional 10 acres. Running the wheels on a slight ridge reduces rutting and traction problems as the water will run from the tracks. Recommendations that ridges be built around the field and circular planting be used for a more efficient field operation are presented. Smoothing small land undulations and planting parallel to the wheel tracks to eliminate water trapping will result in a more uniform infiltration. Preirrigation, a very important farming practice, when used to the full depth of the root zone, helps to break up surface crusts at the time of planting, and to condition the soil to accept irrigation water. Operating pressure of 85 to 90 psi is recommended at the pivot for common sprinkler spacings of about 30 ft. High operating pressures produce a more constant application of water which can be absorbed easily by the soil. (USBR)
W73-11738

MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W73-11767

FOREST SOILS AND THE ASSOCIATED SOIL--PLANT WATER REGIME,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 02I.
W73-11933

EFFECT OF PRE-SOWING EXPOSURE OF SEEDS TO GAMMA RADIATION ON THE DROUGHT RESISTANCE BEHAVIOR OF BARLEY PLANTS (HORDEUM VULGARE L.),
Banaras Hindu Univ., Varanasi (India). Lab. of Plant Physiology.
O. K. Garg, B. C. Misra, and B. P. Singh.
Plant Soil. Vol 36, No 1, p 39-45, 1972.
Identifiers: *Barley-M seeds, Behavior, Drought, *Gamma radiation, Growth, Hordeum-vulgare-M, Metabolism, Plants, Seeds, Pre-sowing.

In a pot-culture experiment plants were subjected to wilting treatments at tillering stage and were maintained so for 10 days. Observations on survival capacity, growth behavior and physiological changes were made. Reduction in soil moisture caused a setback in the physiological status of the plants and inhibited crop growth. Exposure to gamma-radiation induced drought tolerance, improved growth and maintained an active metabolism even under wilting conditions.--Copyright 1972, Biological Abstracts, Inc.
W73-11953

AN ACT PROPOSING AN AMENDMENT TO ARTICLE IV, SECTION 93, AS AMENDED, OF THE CONSTITUTION OF ALABAMA RELATIVE TO PROVIDING IRRIGATION AND WATER CONSERVATION IN THE STATE.
For primary bibliographic entry see Field 06E.
W73-11963

FLOOD AND EROSION CONTROL.
For primary bibliographic entry see Field 06E.
W73-11978

SOIL CONSERVATION AND FLOOD CONTROL DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-11979

SOIL PHYSICAL CONDITIONS AFFECTING SEEDLING ROOT GROWTH: II. MECHANICAL IMPEDANCE, AERATION AND MOISTURE AVAILABILITY AS INFLUENCED BY GRAIN-SIZE DISTRIBUTION AND MOISTURE CONTENT IN SILICA SANDS,
Macdonald Coll., Ste. Anne de Bellevue (Quebec). Dept. of Soil Science.
For primary bibliographic entry see Field 02I.
W73-12163

DEW ON WHEAT,
Wye Coll., Ashford (England).
S. W. Burrage.
Agric Meteorol. Vol 10, No 1/2, p 3-12. 1972. Illus.
Identifiers: Air temperature, *Dew, Gradients, Heat, Leaves, Radiation, Vapor, *Wheat-M.

The spatial distribution of leaves, stems and ears within a crop of winter wheat was determined and related to air movement and radiation. Wet and dry bulb air temperatures and leaf temperatures were measured at 4 heights within the crop. The quantity of dew deposited was determined by absorption on blotting paper and weighing. Although greater quantities of dew condensed in the upper regions of the crop, most plant surfaces experienced dew periods of similar duration. On the 10 occasions measured, these lasted 4-14 hr with quantities of dew deposited ranging from 0.02 to 0.33 mm/night. Vapor pressure gradients indicated that the condensation above 60 cm occurred as dewfall and that below 60 cm as distillation, the former being normally about twice the latter. A surface-wetness recorder at a nearby agrometeorological station gave closely similar readings to the duration of surface wetness in the crop.--Copyright 1972, Biological Abstracts, Inc.
W73-12182

ON THE DETERMINATION OF VERTICAL FLUXES IN FIELD CROP STUDIES,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Research and Regional Survey.
G. F. Byrne, and C. W. Rose.
Agric Meteorol. Vol 10, No 1/2, p 13-17. 1972. Illus.
Identifiers: Agricultural studies, Carbon dioxide, Crops, *Field crop studies, Fluxes, Heat, Transport theory, Vapor, *Vertical fluxes, Water vapor, *Winds.

The use of 1-dimensional transport theory in the measurement of vertical fluxes of such quantities as heat, water vapor and CO2 in situations of agricultural interest may often be inappropriate because of a non-zero mean vertical wind component. Examples of such situations are described and means of detecting them are suggested.--Copyright 1972, Biological Abstracts, Inc.
W73-12183

US-USSR EXPERTISE EXCHANGE,
For primary bibliographic entry see Field 06E.
W73-12255

EFFECT OF WATER STRESS AND HIGH TEMPERATURE ON NITRATE REDUCTION IN CITRUS LEAVES,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Div. of Citriculture.
A. Shaked, A. Bar-Akiva, and K. Mendel.
J Hortic Sci, Vol 47, No 2, p 183-190, 1972, Illus.
Identifiers: *Citrus-D leaves, *Israel, Leaves, *Nitrate reduction, Temperature, Water stress.

Nitrate content tended to be inversely related to nitrate reductase in leaves of mature 'Valencia' orange trees located at Bet Dagan, Israel. Field and greenhouse experiments supported the hypothesis that the observed low nitrate reduction and resulting nitrate accumulation in citrus leaves in the summer could be explained on the basis of the separate and combined effects of water stress and temperature stress on citrus plants.--Copyright 1972, Biological Abstracts, Inc.
W73-12330

WIND DISSEMINATION OF WATERBORNE ERWINIA AMYLOVORA FROM PYRUS TO PYRACANTHA AND COTONEASTER,
Iowa State Univ., Ames. Dept. of Horticulture.
R. J. Bauske.
Phytopathology, Vol 61, No 6, p 741-742, 1971, Illus.
Identifiers: Blight, Cotoneaster-integerrima-D, Dissemination, *Erwinia-amylovora, *Pathogens, Pyracantha-coccinea-D, Pyrus-communis-D, Simulated, Weather, Winds, *Pear trees, Bacteria.

Field-grown 2-yr-old Pyrus communis 'Bartlett,' Cotoneaster integerrima Medic., Chaenomeles japonica Lindl., and Pyracantha coccinea 'Kasan' were planted in 6-in clay pots with standard potting soil. To determine the dispersal pattern of water from pear foliage, air was blown through pear trees sprayed with a dye made from food coloring and water. An oscillating fan with settings that produced wind speeds of 7 and 14 mph was placed 12 in from the sprayed trees. E. amylovora inoculum was either sprayed on flowers on immature leaf surfaces with an aerosol sprayer or poured over plant surfaces that were then punctured with a dissecting needle. Inoculated plants were incubated for 48 hr under clear plastic bags. Bacteria were disseminated from infected to healthy plants by simulating a rainstorm with an oscillating fan and a suspended hose with a 2-hole fogging nozzle. Air movement of 7 and 14 mph is capable of moving water droplets at least 40 in, the usual distance between nursery rows. The fan-blown dye produced spots on targets 1/64 to 1/4 in. in diameter. At the greater wind speed, droplets

were delivered higher than the source tree. Inoculation of Cotoneaster and Pyracantha by puncturing succulent shoot tips produced infections that progressed only 1/2 in. down the shoots in Cotoneaster, but 3-4 in. in Pyracantha. Similar inoculations in Chaenomeles yielded no visible infections. Although simulated wind and rain moved the fire blight pathogen from infected pear trees to flowers on previously uninfected Cotoneaster and Pyracantha, and the resulting infections did spread downward into the shoots of shrubs, the lack of transmission of fire blight to foliage of Cotoneaster and Pyracantha reduces considerably the chance that this might occur in the nursery; however, infections were occasionally established on wind-damaged foliage of these shrubs when inoculum was sprayed upon them.--Copyright 1972, Biological Abstracts, Inc.
W73-12338

NITROGEN FERTILIZER RESPONSES OF HETEROPOGON CONTORTUS AND A PASPALUM PLICATULUM PASTURE IN RELATION TO RAINFALL IN CENTRAL COASTAL QUEENSLAND,
Commonwealth Scientific and Industrial Research Organization, St. Lucia (Australia). Cunningham Lab.
L. 'T Mannetje, and N. H. Shaw.
Aust J Exp Agric Anim Husb. Vol 12, No 54, p 28-35. 1972. Illus.
Identifiers: *Australia (Queensland), Chloride, Coastal lands, *Fertilizers, Heteropogon-Contortus-M, *Nitrogen, Paspalum-Plicatulum-M, Pastures, Phosphates, Potassium, Rainfall, Soils, Yield.

An indigenous pasture in which H. contortus, and a sown pasture in which P. plicatulum was dominant were fertilized with standard applications of superphosphate and potassium chloride. During 5 yr the pastures were treated with 0, 56, 112, 168 and 336 kg N ha-1 per year as urea in 3 equal dressings. Both pastures responded similarly in dry matter yield, N recovery and N concentration. The yield responses were linear and had a mean of 23 kg ha-1 year-1 for every kg of applied N; the mean recovery in plant tops was 44% for Heteropogon and 50% for Paspalum; the N concentration of both pastures was increased from about 1% without N to a maximum of 2% with 336 kg N. The response in yield and the N recovery were linearly related to summer rainfall. In the indigenous pasture 336 kg N ha-1 reduced the proportion of H. contortus by more than half and plants died at the 2 highest levels of N. Resulting bare ground was first filled by weeds and later by introduced grasses from adjacent areas. In the Paspalum pasture P. plicatulum was partly replaced by H contortus at low levels of N. Soil N increased, while pH and exchangeable K decreased with increasing amounts of N.--Copyright 1972, Biological Abstracts, Inc.
W73-12341

EFFECTS OF IRRIGATION AND FERTILIZATION ON YIELDS AND CHEMICAL COMPOSITION OF CORN AND ON THE CHANGES IN THE AVAILABLE K CONTENTS OF A CECIL SOIL,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
J. A. Lutz, Jr., C. I. Rich, and E. B. Hale.
Commun Soil Sci Plant Anal. Vol 3, No 3, p 231-242. 1972. Illus.
Identifiers: *Cecil soil, Chemical composition, *Corn-M, Crops, *Fertilization, Irrigation, *Potassium, Rye-M, Soil, Yields, Zea-Mays-M.

Corn (Zea mays L.) was grown for 5 consecutive yr on Cecil fine sandy loam. Plant nutrients consisting of 0, 56, 140, 224 and 280 kg N/ha; 0, 15, 37.5, 60 and 75 kg P/ha, and 0, 28, 70, 112 and 140 kg K/ha were applied in a central composite rotatable design in each of the 5 yr. All plant residue was removed each year when the corn was harvested and the plots were seeded without fertilization to rye each year as a cover crop. One-half of the experiment was irrigated when there was a 50% depletion of available soil moisture in the 0- to 45-cm soil depth. The available K content of the 0- and 15-cm soil depth was not significantly affected by irrigation but decreased with cropping at all rates of applied K. Decreases in available K were less pronounced with increased rates of applied K. The available K content of the 90- to 120-cm depth was similar where 0 and 140 kg K/ha were applied. Irrigation, as compared with no irrigation, decreased the level of available K throughout the profile on uncropped and unfertilized plots. Irrigation increased the N content of corn leaves but did not increase the P and K contents. Corn responsed to N during the last 4 yr, to K only in the 5th yr, and there was no response to P fertilization.--Copyright 1972, Biological Abstracts, Inc.
W73-12343

WEATHER FACTORS AFFECTING THE DEVELOPMENT OF MAIZE FROM SOWING TO FLOWERING,
British Meteorological Office, Bracknell (England).
M. N. Hough.
J Agric Sci. Vol 78, No 2, p 325-331. 1972. Illus.
Identifiers: *England, Flowering, *Maize-M, Solar radiation, Sowing, Temperature, Transpiration, *Weather conditions.

The phenological development from sowing to flowering of the early maize hybrid INRA 200 is related to the weather conditions. Plot trial data from Wytham, near Oxford, England, and weather information from that and nearby sites formed the basic data. The mean rate of development per day from sowing to emergence is related by linear correlation analysis to the mean values of soil temperature at 5 cm depth and soil moisture deficit. A range of temperature thresholds for emergence development exist, which depend upon the soil moisture, and which differ from the true physiological threshold. Between emergence and flowering the mean rate of development per day is related by linear correlation analysis to mean air temperture, solar radiation and potential transpiration estimated from weather data. All correlations are significant, but the parameters which combine radiation and temperature are statistically better.--Copyright 1972, Biological Abstracts, Inc.
W73-12346

THE EFFECT OF PLANT POPULATION AND IRRIGATION ON SUGAR BEET,
Reading Univ. (England). Dept. of Agriculture.
P. M. Harris.
J Agric Sci. Vol 78, No 2, p 289-302. 1972. Illus.
Identifiers: Beet-D, Density, *England, Irrigation, Plant popultion, *Sugar beets.

Four experiments are described in which the response of sugar beet to irrigation was measured over a range of approximately 30,000-150,000 plants/ha, and 1 experiment where the effects of plant population and spatial arrangement were studied. The experiments were carried out on a sandy soil in the south-east of England and extended from 1960-1965. The response of sugar beet to irrigation was affected by plant density. It is suggested that some explanation for the modified responses may be provided by considering effects of plant population on the rate at which the soil surface is covered by leaves, and effects on the volume of soil exploited for water.--Copyright 1972, Biological Abstracts, Inc.
W73-12348

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

SYSTEMS ANALYSIS OF THE GREAT LAKES,
Michigan Univ., Ann Arbor. School of Public Health.
R. A. Deininger, and Y. Su.
Available from the National Technical Information Service as PB-221 984, $3.00 in paper copy, $1.45 in microfiche. Publication UMICH-ENVSA-73-02, May 1973. 12p. OWRR-C-1602 (No 3145) (1). 14-31-0001-3145.

Descriptors: *Great Lakes, *Systems analysis, *Mathematical models, Optimization, Management, Computer programs, Economics, *Water levels, *Flow control.
Identifiers: *Lake level control, Markov chain models.

The feasibility is examined of controlling the levels of the Great Lakes through control of the outflow from each lake to satisfy given objectives. The multi-lake system is described by a periodic Markov chain decision model. Special algorithms and computer programs were developed which will allow the solution of the large scale optimization problems. Results of the application of these models show that better operating rules for the Great Lakes system exist than those presently in use.
W73-11703

DRAINAGE UNDER STATE LAWS (MINNESOTA AND ARKANSAS).
For primary bibliographic entry see Field 06E.
W73-11966

BURNS V. COASTAL PETROLEUM COMPANY (ACTION TO DETERMINE WHETHER BOTTOM OF LAKE WAS INCLUDED WITHIN OIL AND MINERAL LEASE).
For primary bibliographic entry see Field 06E.
W73-11968

WATER RIGHT CHANGES TO IMPLEMENT WATER MANAGEMENT TECHNOLOGY,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 06E.
W73-11969

KANSAS-NEBRASKA BIG BLUE RIVER COMPACT.
For primary bibliographic entry see Field 06E.
W73-11972

SABINE RIVER AUTHORITY.
For primary bibliographic entry see Field 06E.
W73-11975

BOWIE DAM AND LAKE PASCAGOULA RIVER BASIN, MISSISSIPPI AND ALABAMA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 08A.
W73-11977

FLOOD AND EROSION CONTROL.
For primary bibliographic entry see Field 06E.
W73-11978

SOIL CONSERVATION AND FLOOD CONTROL DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-11979

INTERSTATE DRAINAGE DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-11981

FLOOD CONTROL.
For primary bibliographic entry see Field 06E.
W73-11987

PROTECTION FROM FLOODS.
For primary bibliographic entry see Field 06E.
W73-11990

MILLDAMS AND RACES.
For primary bibliographic entry see Field 06E.
W73-11992

BIG CYPRESS PRESERVE, FLORIDA.
For primary bibliographic entry see Field 06E.
W73-11993

DEEP DRAFT HARBOR AND TERMINAL AUTHORITY.
For primary bibliographic entry see Field 06E.
W73-11994

KEHOE LAKE, TYGARTS CREEK, KENTUCKY (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 06E.
W73-11999

A MASTER PLANNING METHODOLOGY FOR URBAN DRAINAGE,
Rice (Leonard) Consulting Water Engineers, Denver, Colo.
H. F. Bishop.
Preprint No. 1887, American Society of Civil Engineers, National Water Resources Engineering Meeting, Washington, D.C., January 29-February 2, 1973. 21 p, 2 fig, 3 ref. Price: $0.50.

Descriptors: *Urban drainage, *Systems analysis, *Regional analysis, *Drainage systems, Regional development, Environmental engineering, Flood control, Drainage, Management, Colorado.
Identifiers: *Denver (Colo), *Project REUSE.

Effective operation and maintenance of the urban environment requires the coordinated management of the various elements that comprise the area. One of the principal elements of the urban systems is water resources management, including urban drainage and flood control. Project REUSE, a joint undertaking of the Denver Regional Council of Governments and the Urban Drainage and Flood Control District, includes an application of systems engineering to the development of an area-wide management program for urban drainage and flood control. The first application of this methodology was in the master plan for Henry's Lake. Five basic steps in the process are: (1) acquire and develop the facts, (2) analyze the present and future runoff expected, (3) identify major drainage concepts and alternatives, (4) develop, adopt, and implement the master plan for major drainage and design and construct the intital system, and (5) operate the system and program, enforcing needed regulations. In the Henry's Lake case, this approach was complicated by annexation of portions of the basin by the City of Denver. Full implementation has not yet taken place, as Denver has not yet approved the master plan developed for the region. (Poertner)
W73-12006

ENGINEERING REPORT ON MASON STREET AND MILBANK AVENUE DRAINAGE AND DRAINAGE SYSTEMS, GREENWICH, CONNECTICUT.
Gannett Fleming Corddry and Carpenter, Inc., Harrisburg, Pa.
For primary bibliographic entry see Field 08A.
W73-12011

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM. VOLUME I: GOALS, OBJECTIVES, AND STANDARDS FOR WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT,
Diversified Consultants, Inc., Jackson, Miss.
For primary bibliographic entry see Field 05D.
W73-12016

FLOOD PLAIN REPORT - CITY OF SOUTHFIELD.
Southfield City Administrator's Office, Mich.

May 1970. 64 p, 1 fig, 4 tab.

Descriptors: *Flood plains, Planning, Urbanization, Land use, Recreation, Environmental effects, Ecology, Michigan.
Identifiers: *Flood plain management, *Southfield (Mich).

The functions and uses of flood plains in an urbanizing area are discussed from several points of view. Basic background information related to flood plain management is presented in sections: (1) a planning-oriented discussion of the land use aspects of flood plain development; (2) an engineering-oriented discussion of the function of part of the flood plain as a floodway; (3) a presentation of federal, state, and local laws related to flood plain control; (4) a discussion and inventory of various ecological aspects of river basin and flood plain systems; (5) a proposed program for park land acquisition and recreation facilities in flood plain areas; and (6) a short discussion of the tax assessment status of flood plains in Michigan. (Elfers-North Carolina)
W73-12045

'DESERT' BECOMES 'DOWNS:' THE IMPACT OF A SCIENTIFIC DISCOVERY,
Adelaide Univ. (Australia). Dept. of Botany.
A. Marshall.
Aust Geogr, Vol 12, No 1, p 23-34, 1972, Illus.
Identifiers: *Australia (Ninety-mile Desert), *Desert ('Downs'), Elements, Land use, Rainfall.

The Ninety Mile Desert lies between Adelaide and Melbourne, Australia. Nearly all this country has a rainfall of more than 17 inches, hardly a desert by Australian standards. The appearance and disappearance of this desert are discussed. Early appraisal of the country; land use in the period before 1950; the pattern of soils and trace deficiency; and post-war land use are considered.–Copyright 1972, Biological Abstracts, Inc.
W73-12047

RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA, ARKANSAS, AND TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).

Available from National Technical Information Service, U.S. Dept. of Commerce as EIS-LA-72-5162-F. $3.25 in paper copy, $1.45 in microfiche. June 9, 1972. 107 p, 1 plate.

Descriptors: *Louisiana, *Environmental effects, *Flood control, *Channel improvements, Arkansas, Texas, Flood protection, Levees, Check structures, Civil engineering, Cutoffs, River regulation, Watershed management, Navigation, Recreation facilities, Water management (Applied), River training, Turbidity.
Identifiers: *Environmental Impact Statements, *Red River, Revetments.

Emergency flood control measures are presently required at 16 locations along the Red River between the Mississippi River and the vicinity of Index, Arkansas, 12 of which are in Louisiana and four in Arkansas. Proposed corrective measures include bendway cutoffs and appurtenant structures to maintain the alinement achieved by the cutoffs and closures to preserve the oxbows; revetments for stabilizing the banks to protect levees and existing developments; and the erection of training works and construction of revetment reinforcement to alleviate undermining of existing works during high water. Adverse environmental effects include the utilization of 1080 acres of land, shortening of the Red River, alteration of the natural appearance of the river and land area and a temporary increase in the turbidity of the water. Alternatives were considered in the selection of the types of stabilization of protective locks, the location and limits of coverage, the degree of channel alinement, and methods for construction and maintenance. The project will reduce flood damages, provide improved recreation facilities and enhance navigation on the Red River. (Mockler-Florida)
W73-12196

HORSE RANGE SWAMP WATERSHED PROJECT, ORANGEBURG COUNTY, SOUTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Columbia, S.C.
For primary bibliographic entry see Field 04D.
W73-12201

LITTLE RIVER INLET NORTH CAROLINA AND SOUTH CAROLINA–NAVIGATION (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Charleston, S.C.

Available from National Technical Information Service, U.S. Dept. of Commerce as EIS-SC-5324-F. $4.25 in paper copy, $1.45 in microfiche. June 1972. 41 p, 1 map, 1 append.

Descriptors: *South Carolina, *North Carolina, *Environmental effects, *Navigation, *Dredging, Dikes, Jetties, Inlets, Channel improvement, Turbidity, Channels, Recreation facilities, Beaches, Channel morphology, Commercial fishing, Economics.
Identifiers: *Environmental Impact Statements, *Little River Inlet (N.C. and S.C.), Intracoastal waterway.

This navigation project consists of channels, jetties and sand transition dikes at Little River Inlet, North Carolina and South Carolina. The environmental effects consist of improved navigability of inner channel and ocean entrance and enhanced commercial fishing operations. Recreational boating enthusiasts will also benefit from the project. Adverse environmental effects include a temporary increase in turbidity during construction and future maintenance operations. No alternative plans were developed and no action was deemed impractical. Comments were received from concerned agencies. (Smith-Adam)
W73-12202

AQUATIC PLANT CONTROL AND ERADICATION PROGRAM, STATE OF TEXAS (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Galveston, Tex.

Available from National Technical Information Service, U.S. Dept. of Commerce, as EIS-TX-72-5641-F. $7.25 in paper copy, $1.45 in microfiche. July 27, 1972. 87 p, 1 plate.

Descriptors: *Aquatic weed control, *Herbicides, *Dissolved oxygen, *Texas, *Environmental effects, Water hyacinth, Navigable waters, Navigation, Flood control, Recreation, Public health, Agriculture, Drainage, Alligatorweed, Vegetation establishment, Fish conservation, 2-4-D, Toxins.
Identifiers: *Environmental Impact Statements.

This aquatic weed control program would continue the control and progressive eradication of water hyacinth and alligatorweed in the navigable waters of Texas in the combined interest of navigation, flood control, drainage, agriculture, fish and wildlife conservation, recreation, public health, and other related purposes. The dying vegetation may temporarily deplete the dissolved oxygen and present a noxious condition toxic to fish. The amine salt and butoxyethanol used for control of water hyacinth are extremely toxic to many broadleaf plants; however, close control of methods of application and observance of season of application and atmospheric conditions will be maintained to prevent damage to other plant species. Alternatives considered included alternate methods of spraying, mechanical control, restricting the supply of nutrients to the water, research to discover a biological control for water hyacinth, and no action at all. Some risk is inherent in the use of the herbicide treatments, but it can be minimized by adhering to all necessary precautions. (Mockler-Florida)
W73-12203

UNION DRAINAGE DIST. NO. 1 V. SPECIAL DRAINAGE DIST. (ACTION BY DRAINAGE DISTRICT TO IMPOSE LIABILITY ON ADJOINING DRAINAGE DISTRICTS TO BEAR SHARE OF COST OF CLEAN-OUT WORK ON DITCHES IN THE DISTRICT).
For primary bibliographic entry see Field 06E.
W73-12208

DRAINAGE LAW IN NORTH DAKOTA: AN OVERVIEW,
North Dakota Univ., Grand Forks. School of Law.
For primary bibliographic entry see Field 06E.
W73-12215

REPORT ON WATER SUPPLY STUDY OF CERTAIN URBAN COMMUNITIES IN THE QU'APPELLE RIVER BASIN.
Saskatchewan Water Resources Commission, Regina. Water Rights Branch.
For primary bibliographic entry see Field 06D.
W73-12233

FLOOD PLAIN INFORMATION, LEHIGH RIVER, JORDAN CREEK AND TROUT CREEK, CITY OF ALLENTOWN, PENNSYLVANIA.
Army Engineer District, Philadelphia, Pa.

Prepared for the Allentown City Planning Commission, September 1971, 25 p, 10 fig, 11 plates, 7 tab.

Descriptors: *Flood forecasting, *Flood plains, Flood data, Urbanization, Planning, Flood stages, Land use, *Pennsylvania.
Identifiers: Allentown (Pennsylvania), *Lehigh River, Flood plain management.

Special emphasis is placed on possible future floods in the Allentown, Pennsylvania area. These floods are illustrated via various tables of data and, most graphically, through the use of photographs indicating possible flood levels in several urban locations and on several maps of the stream reaches within the urbanized areas of Allentown. The flood hazard maps show the urban areas that would be inundated by an intermediate regional flood and a standard project flood. A discussion of the settlement of the valley area and particularly the flood plains, records of past floods, and information on various factors, such as channel obstructions or flood warnings, that may affect the impact of floods are included. Land use planning control in flood plain areas is very important. (Elfers-North Carolina)
W73-12238

FLOOD PLAIN INFORMATION, LITTLE LEHIGH CREEK, CEDAR CREEK, LITTLE CEDAR CREEK, ALLENTOWN, PENNSYLVANIA.
Army Engineer District, Philadelphia, Pa.

Prepared for the Allentown City Planning Commission, October, 1972. 36 p, 18 fig, 15 plates, 8 tab.

Descriptors: *Flood forecasting, *Flood plains, Flood data, Planning, Flood stages, Urbanization, Land use, *Pennsylvania.
Identifiers: *Flood plain management, *Allentown (Pennsylvania).

Data are presented from the 1972 floods which were the worst in the recorded history of the local streams near Allentown, Pennsylvania. Emphasis is on possible future floods which could be much worse than those recorded. Most of the land adjacent to the streams is presently open or rural, but there are strong pressures building for urbanization. Thus, land use planning and flood plain management programs will be very important. A discussion of the settlement of the valley area, records of past floods, photographs to illustrate the levels future floods could reach, information on various factors such as obstructions and flood warnings that may affect the impact of floods, and numerous flood hazard maps are given. (Elfers-North Carolina)
W73-12239

MOSQUITOES OF ARIZONA,
Arizona Univ., Tucson.
J. L. McDonald, T. P. Sluss, J. D. Land, and C. C. Roan.
Arizona Agricultural Experiment Station, Technical Bulletin 205. June 1973. 21 p. 10 fig., 1 tab., 14 ref.

Descriptors: *Mosquitoes, *Arizona, *Life cycles, *Pest control, *Water holes, Irrigation water, Systematics, Insects, Environmental sanitation.
Identifiers: Encephalitis.

An up-to-date summary is presented of the female mosquitoes of Arizona. Simplified illustrated keys to genera and species, together with brief diagnostic descriptions of species, are included. A table shows distribution by counties, and summaries of known life cycles. Because of the appearance of encephalitis, both WEE and VEE, in the southwest U.S., there is renewed interest in Arizona mosquitoes from a public health point of view. Recent abnormal and unusual rainfall in Arizona may cause explosive increases in the numbers at any time. Although important mainly as pests rather than vectors, the extent of irrigation present near the main centers of population creates a potential for breeding areas that must be recognized as latently hazardous. Horse and cattle watering troughs and pools in both urban and rural areas add to this possibility. Recommendations for control include avoidance, exclusion, and suppression. (Paylore-Arizona)
W73-12243

DROUGHT EFFECTS ON A SEMIDESERT GRASSLAND RANGE,
Agricultural Research Service, Las Cruces, N. Mex. Plant Science Research Div.
For primary bibliographic entry see Field 02I.
W73-12247

INTERNATIONAL SYMPOSIUM ON UNCERTAINTIES IN HYDROLOGIC AND WATER RESOURCE SYSTEMS, VOL. I.

Available from University of Arizona, Tucson, Dept. of Hydrology and Water Resources, $22.00 for 3 Vols. Proceedings (Vol I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, Dec 11-14, 1972. 449 p. (1972).

Descriptors: *Water resources development, *Planning, *Management, *Decision making, Economics, *Systems engineering, *Stochastic processes, *Simulation analysis, Hydrology, Data collections, Projects, Hydraulics, Time, Techology, Systems analysis, Mathematical models, Analytical techniques, Streamflow forecasting, Computer programs, Probability, Optimization, *Risks.
Identifiers: Data worth.

This symposium focuses upon the role of the decision sciences in evaluating uncertainties inherent in water resource planning, design, investment, and operations. Included is the interface between water resource management/society/nature/man. Decision sciences refers to the overlapping bodies of knowledge encompassed by operations research, systems analysis, mathematical economics, mathematical statistics, decision theory, social sciences and other relevant subjects used in systems engineering. Specifically, scientific and socio-economic worth of data and models is emphasized, including the complementary effects of time, technology and budgetary constraints in reaching decisions and in designing collection networks for hydrologic and water resource data. Considered are uncertainties in regional planning, flood control, water supply, environmental quality management (in relation to water resources), and other relevant areas of water management; externalities in space and time are of prime importance. An objective of the symposium is to clarify the various dimensions of uncertainty, such as the amount of information available on a specific problem, and the sources or causes of the uncertainty of outcomes. The Proceedings is published in three volumes (See W73-12270 thru W73-12294) (Bell-Cornell)
W73-12269

BAYESIAN ESTIMATION AND DESIGN OF EXPERIMENTS FOR GROWTH RATES, WITH APPLICATIONS TO MEASURING WATER QUALITY,
American Cyanamid Co., Norwalk, Conn.
For primary bibliographic entry see Field 05A.
W73-12270

ENVIRONMENTAL CONTROL SYSTEMS: TREATMENT OF UNCERTAINTY IN MODELS AND DATA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06A.
W73-12271

EVALUATION OF SEASONAL TIME-SERIES MODELS: APPLICATIONS TO MID-WEST RIVER FLOW DATA,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 07C.
W73-12272

TECHNOLOGICAL UNCERTAINTY IN THE ECONOMIC EVALUATION OF NEW WATER RESOURCES,
Hawaii Univ., Honolulu. Coll. of Business Administration.
For primary bibliographic entry see Field 06A.
W73-12273

METHODS FOR ASSESSING VARIABILITY, WITH EMPHASIS ON SIMULATION DATA INTERPRETATIONS,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 07C.
W73-12274

EVALUATION OF PREDICTION ERROR PROBABILITIES FROM STOCHASTIC MODELS BY SIMULATION,
Kentucky Univ., Lexington.
C. T. Haan.
In: Proceedings (Vol. *), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972, p 91-103, (1972). 1 fig, 2 tab, 15 ref.

Descriptors: *Water resources, Hydrology, *Simulation analysis, *Probability, *Stochastic processes, *Estimating, *Model studies, Systems analysis, Equations, Runoff, Streamflow, Rainfall, Projects, Design, Reservoirs, Size, Storage capacity, Human population.
Identifiers: Errors, Data worth.

The adequacy of any water resource system designed solely on the basis of historical records can be assessed only in terms of what has happened in the past. Since future hydrologic sequences will not be the same as the historical sequences, the performance of the system should be evaluated in terms of possible future realizations of the hydrologic process. These future realizations can be obtained only using a stochastic model; any type of stochastic model will have parameters that must be estimated in some manner from historical data. Simulation techniques have been used to estimate the probability of errors of various magnitudes from stochastic models and how these error probabilities change as the number of observations used in estimating the parameters of the stochastic model change. A procedure is given whereby a quantitative estimate can be made of the probability that a stochastic model will produce results that are in error by less than (more than) a specified amount. The procedure can also be used to evaluate the worth of additional data in the sense that one can estimate how the probabilities of errors change as more data is used to determine model parameters. (See also W73-12269) (Bell-Cornell)
W73-12275

FLOOD EVALUATION - CAN STOCHASTIC MODELS PROVIDE AN ANSWER,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 07C.
W73-12276

ANALYSIS OF STREAMFLOW FORECASTING UNCERTAINTY,
California State Univ., Sacramento.
M. R. Packer.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, p 115-121, (1972) 2 fig.

Descriptors: Hydrology, *Streamflow forecasting, *Temperature, *River basins, Snowmelt, *Runoff, Floods, Weather forecasting, Seasonal, Water resources, Optimum development plans, Planning, Management, *California, Risks.
Identifiers: *Error, *San Joaquin Drainage Basin (Calif), Friant Dam (Calif), Daily forecasts.

Streamflow forecasts are vital for the optimum utilization of water resources. Forecasts are valuable on controlled rivers (permitting better operation and increased project benefits) as well as on uncontrolled rivers (reducing flood damage by flood warnings). Errors involved in actual streamflow forecasting of a basin subject primarily to snowmelt runoff have been investigated. The sensitivity of streamflow forecasts to meteorological forecast errors has also been examined. The San Joaquin River Basin in California, one of the nation's most controlled streams, was chosen as study area; reservoir operation based on river forecasting is extremely important in maximizing the economic requirements of this area. Snowmelt floods for 1967 and 1969 have been analyzed and daily forecasts studied for 1 to 5 days in advance. The study has been concerned with the statistical evaluation of streamflow forecast errors, exhibiting stable average outcomes. It is verified and quantified that streamflow forecast errors for snowmelt floods are related to temperature forecast errors. The relationship is more distinct for daily streamflow forecasts made more than two days into the future. There is an indication of a constant relationship of forecast errors of streamflow and temperature from year to year when the streamflow errors are in terms of the average seasonal daily flow. (See also W73-12269) (Bell-Cornell)
W73-12277

BIAS, ILLUSION, AND DENIAL AS DATA UNCERTAINTIES,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-12278

RELIABILITY AND UNCERTAINTY IN PREDICTING TRANSPORT PROCESSES IN NATURAL STREAMS AND RIVERS,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
C. L. Chiu.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 137-158, (1972). 10 fig, 3 equ, 2 ref.

Descriptors: *Natural streams, Rivers, *Reliability, *Stochastic processes, *Monte Carlo method, *Simulation analysis, Steady flow, Unsteady flow, Flood routing, Mathematical models, Systems analysis, *Risks, *Forecasting.
Identifiers: *Transport processes, Error, Stream geometry.

Geometrical irregularities of a stream cause uncertainty and error in predicted or calculated transport processes in the stream. The level of error tends to vary with the methods of treating the stream cross-sections to be used in a numerical solution of differential equations for the transport processes. Five different methods of treating stream cross-sections are compared, exhibiting different characteristics and effects. In contrast with deterministic methods, Monte Carlo (stochastic) simulation enables evaluating, controlling and reducing the level of the uncertainty and error. Advantages of using a stochastic model are described, including reduction of the requirement of data storage in a computer. Illustrative examples include steady flow studies using Brownian motion and first-order autoregressive models for South Beaverdam Creek (Georgia), and unsteady flows (flood routing) in the same Creek using numerically solved shallow-water equations and two stochastic models and three deterministic models for comparison. Stochastic modeling and simulation has many attractive advantages useful in predicting or studying transport processes in natural streams. (See also W73-12269) (Bell-Cornell)
W73-12279

HYDROLOGIC FORECASTING WITH SEQUENTIAL DETERMINISTIC AND STOCHASTIC STAGES,
Water Resources Board, Reading (England).
D. G. Jamieson, J. C. Wilkinson, and R. P. Ibbitt.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 177-187, (1972). 2 fig, 12 ref.

Descriptors: Hydrology, *Forecasting, *Simulation analysis, *Rainfall-runoff relationships, *Stochastic processes, Hydrographs, Flows, Time series analysis, Mathematical models, Systems analysis.

A hydrologic forecasting procedure with two distinct stages is proposed. The first stage is deterministic and comprises a simple explanatory simulation model for the initial forecast of runoff from rainfall. The second stage is stochastic and involves a time-series model of the discrepancy between the previously forecast hydrograph and the observed flows. Thus the imperfections in the structure of the simple simulation model can be compensated. The residual variance using the composite model is significantly less than that attainable by use of the first stage alone. (See also W73-12269) (Bell-Cornell)
W73-12280

A PLAN FOR THE CONSTRUCTION AND TESTING OF WATER POLLUTION FORECASTING MODELS,
Missouri Univ., Columbia. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 05B.
W73-12281

UNCERTAINTIES IN ESTIMATING RUNOFF--PRODUCING RAINFALL FOR THUNDERSTORM RAINFALL-RUNOFF MODELS,
Agricultural Research Service, Tucson, Arizona. Southwest Watershed Research Center.
For primary bibliographic entry see Field 02A.
W73-12282

STREAMFLOW FREQUENCY USING STOCHASTICALLY GENERATED HOURLY RAINFALL,
CH2M/Hill, Bellvеue, Wash.
For primary bibliographic entry see Field 02E.
W73-12284

EFFECT OF LENGTH OF RECORDS OF MONTHLY FLOWS ON THE FIRST SERIAL CORRELATION COEFFICIENT,
Asian Inst. of Tech., Bangkok (Thailand).
For primary bibliographic entry see Field 02E.
W73-12285

TESTS OF STATIONARITY OF HYDROLOGIC TIME SERIES,
Illinois Univ., Urbana. Dept. of Hydraulic Engineering.
For primary bibliographic entry see Field 02A.
W73-12286

STOCHASTIC MODELS FOR PRECIPITATION,
Metropolitan State Coll., Denver, Colo. Dept. of Mathematics.
For primary bibliographic entry see Field 02B.
W73-12287

PHYSICAL ASSUMPTIONS AND THEIR CONSEQUENCES ON MODELLING GROUNDWATER MOVEMENT,
For primary bibliographic entry see Field 04B.
W73-12288

STOCHASTIC STREAM TEMPERATURE MODEL,
Bonneville Power Administration, Portland, Oreg.
W. L. Morse.

In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 324-339, 1972. 2 fig, 32 ref.

Descriptors: *Stochastic processes, *Mathematical models, *Streamflow forecasting, *Water temperature, *Columbia River, *Statistical methods, Water Resources, Simulation analysis, Equations, Systems analysis, *Washington.
Identifiers: Priests Rapids forbay (Wash), Stochastic differential equations.

The one-dimensional form of the thermal energy conservation principle as a quasilinear partial differential equation (PDE) has been shown accurate for point temperature forecasts on completely moxed streams; however, the nonrandomness of its solution is contrary to the behavior of Nature. With aid of a new evaporation coefficient gamma this PDE model is calibrated by minimizing mean square temperature error in routing historical flows through 123 km of the Columbia River to estimate a best gamma. Water temperature distributions at Priest Rapids forebay for four representative 6-hour time periods under nearly homogeneous climatic conditions are then obtained by a statistical simulation of gamma. This procedure lends inherent dynamicism to evaporation over open channel flow. By eliminating the longitudinal distance variable in the PDE model, a stochastic differential equation (SDE) is formulated with random forcing functions obtained from the meteorologic and forebay depth analyses. Initial conditions are the time-averaged components of the in situ water temperature vector, only one of which is needed to determine the real stochastic process which constitues a solution to the SDE model. Validation of the SDE model is accomplished by statistically testing the temporal means, variances, and distributions of the stochastic process solution with those obtained by the statistical simulation of temperatures from the PDE model and historical record. (See also W73-12269) (Bell-Cornell)
W73-12289

UNCERTAINTIES IN POINT AND AREAL SAMPLING OF PRECIPITATION AND THEIR IMPORTANCE IN HYDROLOGIC COMPUTATIONS,
Ministry of Agriculture and Natural Resources, Nicosia (Cyprus). Dept. of Water Development.
For primary bibliographic entry see Field 02B.
W73-12290

VARIABILITY OF THE SOIL WATER FLOW PARAMETERS AND THEIR EFFECT ON THE COMPUTATION OF RAINFALL EXCESS AND RUNOFF,
Agricultural Research Service, University Park, Pa. Northwest Watershed Research Center.
For primary bibliographic entry see Field 02G.
W73-12291

THE DESIGN OF OPTIMAL PRECIPITATION MEASURING NETWORKS FOR FLOOD FORECASTING,
Enviro-Engineers Ltd., Cincinnati, Ohio.
For primary bibliographic entry see Field 02B.
W73-12292

INFORMATION TRANSFER VIA REGRESSION IN MARKOVIAN WORLDS,
IBM Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 06A.
W73-12294

WATER FOR ALABAMA--IDENTIFICATION OF OBJECTIVES,
Geological Survey of Alabama, University.
For primary bibliographic entry see Field 06B.
W73-12315

4B. Groundwater Management

DRAINAGE UNDER STATE LAWS (MINNESOTA AND ARKANSAS).
For primary bibliographic entry see Field 06E.
W73-11966

UTILIZATION OF GROUND WATER RESOURCES.
For primary bibliographic entry see Field 06E.
W73-11971

GREATER BATON ROUGE WATER CONSERVATION DISTRICT.
For primary bibliographic entry see Field 06E.
W73-11996

JUDICIAL-ORIENTED INSTITUTIONAL SOLUTIONS: SAN GABRIEL VALLEY EXPERIENCE,
Clayson, Stark, Rothrock and Mann, Corona, Calif.
D. D. Stark.
Courtesy Preprint, American Society of Civil Engineers, Water Resources Engineering Conference, Washington, D.C., January 29-February 2, 1973. 102 p, 4 fig, 5 tab, 13 ref.

Descriptors: *Groundwater basins, *Safe yield, *Legal aspects, California, Water rights, Pueblo water rights, Competing uses, Regulated flow, Regulation, Water allocation (Policy), Relative rights, Groundwater availability, Water supply.
Identifiers: *Southern California, San Gabriel Basin.

Increased usage of groundwater supplies has resulted in shortages, and these shortages have led to agreements between water users to limit annual water use. Formalization of these agreements through court action has proved to be an effective means of setting up a system to define the rights and responsibilities of all parties involved and to establish a regulatory body. A detailed example of such an arrangement is the San Gabriel Basin Case. Located in eastern Los Angeles County, California, 24 major water users agreed to a sophisticated institutional arrangement for the protection and provision of ground water supplies. Groundwater basin management efforts in Southern California since World War II have involved a sequence of court cases. At times, more than 4000 parties have been involved and cases have continued as long as 23 years. These previous cases helped establish a method for an orderly settlement of the issues in the San Gabriel Basin Case. This case lasted a total of 5 years and involved 200 parties. Available water resources were identified along with water users--both consumptive and non-consumptive users. Limits were placed on the amount of water to be used by each consumptive user. A board of watermasters was established to regulate the system and to import water needed if groundwater levels fell too low. Cost of the imported water is borne in proportion to consumptive use. (Poertner)
W73-12009

GROUNDWATER RECHARGE THROUGH THE ZONE OF AERATION IN A SANDY DESERT (PITANIYE GRUNTOVYKH VOD PESCHANOY PUSTYNI CHERZ ZONU AERATSII),
For primary bibliographic entry see Field 02F.
W73-12061

GROUNDWATER CONSERVATION.
For primary bibliographic entry see Field 06E.
W73-12227

PHYSICAL ASSUMPTIONS AND THEIR CONSEQUENCES ON MODELLING GROUNDWATER MOVEMENT,
H-P. Luhr.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 304-323, 1972. 6 fig, 7 ref.

Descriptors: *Groundwater movement, Flow, Assessments, *Model studies, Hydrology, *Analytical techniques, Design, Wells, Leakage, Dischage (Water), Clogging, Finite element analysis, Reliability, Calibrations, River beds, Infiltration, Aquifers, Surface waters, Equations, Systems analysis, *Risks.
Identifiers: Physical aspects, Morphology.

The consequences for the groundwater flow caused by well discharges or drawdown in excavations for structures, etc., and the general determination of the groundwater flow, respectively, can be studied most usefully by mathematical models. The assessment of groundwater movement near surface waters with partly clogged beds is of particular importance in the design of production wells. The resulting infiltration through beds is considered in a physical model according to the leaky-aquifer-principle. For investigations of large areas of groundwater flow, two-dimensional, horizontal plane and three-dimensional, discrete mathematical models are developed. These models are organized using the method of finite differences and the technique of finite elements. The uncertainties and resulting reliability of the solutions depending on the choice of mathematical models and on the available model parameters are discussed in general and through the use of an example. The uncertainties resulting from the determination of the model parameters and the calibration process as a possibility to reduce these uncertainties are discussed. (See also W73-12269) (Bell-Cornell)
W73-12288

HYDROGEOLOGIC CHARACTERISTICS OF THE VALLEY-FILL AQUIFER IN THE JULESBURG REACH OF THE SOUTH PLATTE RIVER VALLEY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 02F.
W73-12296

THE EVALUATION AND APPLICATION OF C--14 DATING OF GROUNDWATER,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02F.
W73-12297

THE ENVIRONMENTAL IMPACT OF GROUND WATER USE ON CAPE COD--IMPACT STUDY NO. 3,
For primary bibliographic entry see Field 05B.
W73-12303

FEASIBILITY STUDY OF THE EXPLOITATION OF ELECTROMAGNETIC SURFACE WAVE PROPAGATION FOR MINERAL PROSPECTING AND MAPPING THE WATER TABLE,
Nebraska Univ., Lincoln. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 02F.
W73-12311

WATER FOR ALABAMA--IDENTIFICATION OF OBJECTIVES,
Geological Survey of Alabama, University.
For primary bibliographic entry see Field 06B.
W73-12315

GEOTHERMAL RESOURCES AS A SOURCE OF WATER SUPPLY,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 03A.
W73-12333

4C. Effects on Water of Man's Non-Water Activities

EFFECTS OF DEFORESTATION ON WATER QUALITY,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
G. E. Likens.
In: Symposium on Interdisciplinary Aspects of Watershed Management, August 3-6, 1970, Montana State University, Bozeman, p 133-140. 2 fig, 1 tab, 5 ref.

Descriptors: *Balance of nature, *Forests, *Water quality, Ecosystems, Runoff, New Hampshire, Ions, Sulfates, Bicarbonates, Ammonia, Nitrates, Decomposing organic matter, Nitrification, Temperature, Nutrients, Solar radiation, Eutrophication, Nitrogen cycle, Demonstration watersheds.
Identifiers: *Deforestation, Hubbard Brook (N.H.), White Mountain Natl. Forest (N.H.).

A multidisciplinary study of single, well-defined, watershed-ecosystems was developed in New Hampshire's Hubbard Brook Experimental Forest, where quantitative measurements of the nutrient-hydraulic cycle interactions were made. Results of deforestation on chemical concentrations showed serious malfunctions. Stream runoff increased over that expected had there been no treatment. Stream water became 10 times more acidic, and there were very large increases in concentrations of all major ions except ammonium, sulfate, and bicarbonate. Sulfate and bicarbonate concentrations decreased but ammonium was essentially unchanged relative to undisturbed conditions. An alteration of the basic nitrogen cycle resulted. Total gross export of dissolved substances, exclusive of dissolved organic matter, averaged about 82 metric tons/hectare/year from the deforested watershed and 13 metric tons/hectare/year from an undisturbed watershed during the three years after deforestation. Stream water temperatures after deforestation were some 1 to 5C higher in summer than adjacent streams in undisturbed watersheds. The high nutrient concentrations, increased solar radiation (due to absence of forest canopy) and higher temperature in the stream caused blooms of algae where none had occurred before. (Jones-Wisconsin)
W73-11945

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM. VOLUME IV: AREA WIDE STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT,
Diversified Consultants, Inc., Jackson, Miss.
J. A. Elliott, R. L. Waters, and A. D. Desmarais.
Available from the National Technical Information Service as PB-212 432, $10.75 in paper copy, $01.45 in microfiche. Gulf Regional Planning Commission, Gulfport, Mississippi, 1972. 173 p, 27 fig, 13 tab.

Descriptors: *Comprehensive planning, *Urban drainage, *Flood plains, *Regional analysis, Forecasting, Management, Flood plain zoning, Flood control, Storm runoff, Mississippi, Drainage systems.

The Urban Systems Engineering Demonstration Program of the Gulf Regional Planning Commission has as its general purpose the simultaneous development of systems of waterworks, sanitary sewerage, solid waste management, storm water drainage and flood plain management. This planning commission covers the four counties of Hancock, Harrison, Jackson and Pearl River Counties in Mississippi. This volume is concerned with the development of an inventory and analysis of existing areawide storm drainage systems and preparation of plans to accomodate future needs to 1990. The inventory is based on existing records, plans, and specifications of local, state and federal agencies, while the analysis is based largely upon the adequacy of the drainage facilities to accomodate storm runoff. Recommended improvements are based on the need to reduce flood hazards throughout the region. The Gulf region covers 2608 square miles and has a total population of 268,000 in 1970 of which 74 percent is urban. Eleven cities contain 88 percent of the urban population. The major storm drainage systems in these municipalities are analyzed in detail. Flood plain management is concerned with both the tidal zone and river flood plains. Four steps of action are recommended, namely: (1) flood plain delineation, (2) regulation of land use, (3) construction of flood retarding structures, and (4) a general program of continued studies and surveys of flood plain limits, existing structures, and hydrologic conditions. (Poertner) (See also W73-12016)
W73-12019

HYDROLOGIC CHANGES AFTER CLEAR-CUT LOGGING IN A SMALL OREGON COASTAL WATERSHED,
Geological Survey, Portland, Oreg.
D. D. Harris.
Journal of Research, U.S. Geological Survey, Vol 1, No 4, p 487-491, July-August 1973. 8 fig, 4 tab, 1 ref.

Descriptors: *Clear-cutting, *Rainfall-runoff relationships, Water yield, Erosion, Soil erosion, Sediment yield, Water temperature, Oregon.

Preliminary graphical analysis indicates that clear-cut logging of a small Oregon watershed has significantly altered certain hydrologic characteristics. After logging, moderate increases were noted in annual runoff, but no significant changes were detected in either peak or minimum flow rates. Both the annual sediment yields and the maximum monthly water temperatures increased greatly after logging; sediment yields and temperatures in the unlogged control watershed actually decreased during the postlogging period. (Knapp-USGS)
W73-12066

PROPOSED FLORIDA FRONTIER RIVERS NATIONAL CULTURAL PARK.
For primary bibliographic entry see Field 06E.
W73-12206

4D. Watershed Protection

SABINE RIVER AUTHORITY.
For primary bibliographic entry see Field 06E.
W73-11975

BOWIE DAM AND LAKE PASCAGOULA RIVER BASIN, MISSISSIPPI AND ALABAMA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 08A.
W73-11977

LITTLE CALUMET RIVER BASIN COMMISSION.
For primary bibliographic entry see Field 06E.
W73-11983

BIG CYPRESS PRESERVE, FLORIDA.
For primary bibliographic entry see Field 06E.
W73-11993

DEEP DRAFT HARBOR AND TERMINAL AUTHORITY.
For primary bibliographic entry see Field 06E.
W73-11994

JACKSON-BIENVILLE PARISHES DUGDEMONA WATERSHED DISTRICT.
For primary bibliographic entry see Field 06E.
W73-11995

SOIL CONSERVATION.
For primary bibliographic entry see Field 06E.
W73-12002

DEVELOPMENT OF DWARF GROUND COVER FOR EROSION CONTROL IN COLORADO,
Colorado Div. of Highways, Denver. Planning and Research Div.
H. E. Atchison, and G. C. Pyne.
Available from NTIS, Springfield, Va. 22151 as PB-213 194 - Price $3.00 printed copy; $1.45 microfiche. Final Report CDOH-P and RR-R and SS-72-4, April 1972. 10 p, 2 fig. Contract 1485 FHA.

Descriptors: *Erosion control, *Roadbanks, *Colorado, *Bank stabilization, *Vegetation establishment, Soil stabilization, Arid climates, Mountains, Sediment transport, Sediment control, Investigations, Research and development, Highway beautification, Testing procedures, Grasses, Evaluation.
Identifiers: Dwarf ground-cover vegetation.

Colorado's arid regions and mountainous terrain create the need for a unique ground cover along its highway system to prevent erosion, enhance the beauty of roadside areas, and reduce hazards to the motorist. An investigation is summarized into the possibilities for the development and use of a perennial, dwarf ground cover that would grow at nearly every elevation in Colorado. Such a plant would reseed itself, require no fertilization, and require little or no mowing. Maintenance costs would be reduced to a minimum. (Woodard-USGS)
W73-12071

RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA, ARKANSAS, AND TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 04A.
W73-12196

HORSE RANGE SWAMP WATERSHED PROJECT, ORANGEBURG COUNTY, SOUTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Columbia, S.C.

Available from National Technical Information Service, U.S. Dept. of Commerce as EIS-SC-72-5451-F. $4.50 in paper copy, $1.45 in microfiche. October 1972. 49 p, 1 map, 1 tab, 2 append.

Descriptors: *South Carolina, *Flood protection, *Watershed management, *Environmental effects, Agricultural watersheds, Channel improvement, Flood control, Floods, Agriculture, Drainage, Public health, Wildlife habitats, Drainage programs, Erosion control.
Identifiers: *Environmental Impact Statements, *Horse Range Swamp Watershed (S.C.).

Horse Range Swamp Watershed is located in eastern Orangeburg County, South Carolina. The headwaters of the watershed are one mile south of Lake Marion. This project proposes conservation land treatment measures in the watershed and stream channel enlargement for flood prevention and agricultural water management. The project will reduce flooding, improve drainage, provide

opportunities for residents of the watershed to increase their income, improve health conditions, reduce maintenance costs to public roads, destroy a certain amount of wildlife wood habitat, increase suspended sediment at the watershed outlet, and degrade the ambient air quality during construction. Alternatives considered were channel modification at various downstream points, floodwater retarding structures and land treatment measures. The proposed project is compatible with projected future long-term uses of land, water and other natural resources. Some acreage of croplands and mixed hardwoods and pines will be converted to channel, spoil and maintenance travel way. Comments from interested agencies are included. (Reed-Florida)
W73-12201

SOIL CHANGES CAUSED BY EROSION CONTROL TREATMENTS ON A SALT DESERT AREA,
New Brunswick Univ., Fredericton. Dept. of Biology.
For primary bibliographic entry see Field 02G.
W73-12249

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

WASTE-CAUSED AIR POLLUTANTS ARE MEASURED IN SWINE BUILDINGS,
Illinois Univ., Urbana. Agricultural Experiment Station.
D. L. Lebeda, and D. L. Day.
Illinois Research, p 15, Fall, 1965.

Descriptors: Ventilation, *Farm wastes, *Feed lots, Air pollution, *Hogs.
Identifiers: *Tolerance levels, Gas concentrations, Threshold levels.

The practice of collecting swine waste under partially or totally slotted floors has created a need to discover what pollutants are produced and to determine the tolerance levels of the swine to these pollutants. Untreated ponded swine wastes could hypothetically be expected to produce the same gases that untreated municipal waste creates under anaerobic conditions. A study was undertaken to determine the concentrations of ammonia, hydrogen sulfide, carbon dioxide, and airborne bacteria, with and without forced ventilation, in swine buildings with fluid manure. None of the gas concentrations approached the threshold levels for human occupancy, and research is now being planned to determine the tolerance levels of swine. (Dudley-East Central)
W73-11778

TITRATION OF SULPHATE IN MINERAL WATERS AND SEA WATER BY USING THE SOLID-STATE LEAD ELECTRODE,
Rome Univ. (Italy). Istituto di Chimica Analitica.
For primary bibliographic entry see Field 02K.
W73-11818

THE DETERMINATION OF PLUTONIUM-241 IN EFFLUENTS,
Laboratory of the Government Chemist, London (England). Dept. of Trade and Industry.
K. G. Darrall, G. C. M. Hammond, and J. F. C. Tyler.
Analyst, Vol 98, No 1166, p 358-363, May 1973. 2 fig, 6 tab, 19 ref.

Descriptors: *Radioactive wastes, *Radiochemical analysis, Pollutant identification, Nuclear wastes, Radioisotopes.
Identifiers: *Plutonium, Radiochemistry.

A method is described for the simultaneous determination of plutonium-241 and plutonium alpha-activity. The plutonium is isolated by co-precipitation of barium sulfate followed by extraction into di (2-ethylhexyl) phosphoric acid, which is incorporated in a liquid scintillator for counting in a liquid scintillation spectrometer. Interferences from alpha- and beta-emitting radionuclides are studied together with interferences from non-radioactive elements. The lower limit of detection is in the region of 1 pCi. (Knapp-USGS)
W73-11819

OIL SPILLS: MEASUREMENTS OF THEIR DISTRIBUTIONS AND VOLUMES BY MULTIFREQUENCY MICROWAVE RADIOMETRY,
Hulburt (E.O.) Center for Space Research, Washington, D.C.
J. P. Hollinger, and R. A. Mennella.
Science, Vol 181, No 4094, p 54-56, July 6, 1973. 2 fig, 8 ref.

Descriptors: *Microwaves, *Remote sensing, *Oil spills, Path of pollutants, Pollutant identification, Radar.
Identifiers: *Microwave radiometry.

Aircraft-borne multifrequency passive microwave observations of eight marine oil spills revealed that, in all cases, over 90% of the oil was confined in a compact region comprising less than 10% of the area of the visible slick. These measurements show that microwave radiometry offers a means for measuring the distribution of oil in sea-surface slicks; for locating the thick regions; and for measuring their volumes on an all-weather, day or night, and real-time basis. (Knapp-USGS)
W73-11838

STUDIES OF CATION BUDGETS IN THE SOUTHERN APPALACHIANS ON FOUR EXPERIMENTAL WATERSHEDS WITH CONTRASTING VEGETATION,
National Science Foundation, Washington, D.C.
For primary bibliographic entry see Field 02E.
W73-11860

FUNGI OF THE CHESAPEAKE BAY AND ITS TRIBUTARIES II. THE GENUS CONIOSCYPHA,
Maryland Univ., College Park. Dept. of Botany.
C. A. Shearer.
Mycologia, Vol 65, No 1, p 128-136, January-February 1973. 4 fig, 10 ref.

Descriptors: *Marine fungi, *Systematics, Sampling, Rivers, Plant morphology, Cultures, Chesapeake Bay.
Identifiers: *Conioscypha Spp., Patuxent River, Balsa wood, Culture media.

The morphology and condium ontogeny of two species of Conioscypha isolated from balsa wood submerged in the Patuxent River were studied. One species appears to be identical to the type material of Conioscypha lignicola while the second is described as a new species. The description of the genus Conioscypha is emended on the basis of type and pure culture studies of Conioscypha lignicola. (Little-Battelle)
W73-11861

ABUNDANCE AND DIVERSITY OF MOLLUSCA IN AN INDUSTRIALIZED PORTION OF THE OTTAWA RIVER NEAR OTTAWA-HULL, CANADA,
Ottawa Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-11862

NESTING BASS OBSERVED WITH UNDERWATER TELEVISION,
Cornell Univ., Ithaca, N.Y.
M. H. Shealy, Jr.
New York's Food and Life Sciences, Vol 4, No 4, p 18-20, Oct - Dec 1971. OWRR A-013-NY (8). 14-01-0001-927, 1400 1852, 14-31-0001-3032.

Descriptors: *Bass, Underwater, *Fish behavior, Aquatic environment, Environmental effects, Methodology.
Identifiers: Underwater television.

Environmental factors governing the survival of Largemouth Bass were studied via underwater television. Concurrent with observing the behavior of the fish, weather, temperature, light and chemical conditions were measured. Through television, laboratory findings can be correlated with natural nesting conditions without disturbing the nest and causing abnormal behavior of the adult bass. (Irwin-New York)
W73-11864

PREPARING TELEOST EMBRYOS FOR STUDY,
Cornell Univ., Ithaca, N.Y.
D. L. Galat.
The Progressive Fish Culturist, Vol 34, No 1, p 43-48, January 1972. OWRR-A-013-NY (9). 14-01-0001-927, 1400, 1852, 14-31-0001-3032.

Descriptors: *Fish eggs, Laboratory tests, Preservation, Methodology.

Documentation of the embryonic development of the muskellunge from preserved eggs was most easily performed when live eggs were fixed and preserved in 10 percent formalin and held no longer than 3 months. Eggs to be cleared were washed in tap water. The chorion was removed by dissection after submersion in a 10 percent bleach solution. The embryos were cleared in glycerine, stained with Harris' hematoxylin, and then stored in 80 percent glycerine. Generally the methods described here will yield preserved fish embryos in which development and environmental effects on development can be observed.
W73-11865

METHOD AND APPARATUS FOR DETERMINING OXYGEN CONSUMPTION RATE IN SEWAGE,
Robertshaw Controls Co., Richmond, Va. (assignee)
For primary bibliographic entry see Field 05D.
W73-11883

ENVIRONMENTAL MONITORING REPORT FOR SANDIA LABORATORIES FROM 1964 THROUGH 1972,
Sandia Labs., Albuquerque, N. Mex.
L. W. Brewer.
Available from NTIS, Springfield, Va., as Rpt. No. SLA-73-0339. $5.45 per copy, $1.45 microfiche. Report No. SLA-73-0339, March 1973. 57 p, 8 fig, 4 tab, 9 ref.

Descriptors: *Monitoring, *Environment, *Measurement, *Water pollution, *Radioactivity, *Soil contamination, *Vegetation, Regulation, Administrative agencies, Sampling, Analytical techniques, Cesium, Strontium.

By several different methods, water, soil, and vegetation are regularly monitored and the results analyzed to ensure that Sandia Laboratories' operations are not adversely affecting the surrounding environment. The data from these tests, primarily for radiation levels, are presented for the period 1964 through December 1972. Based upon the environmental sampling data presented, Sandia Laboratories has not released any significant amount of radioactive or nonradioactive contaminants to the environment during the period January 1, 1964, through December 31, 1972. The soil sampling data show less activity than was obtained before the start-up of the two reactor facilities and the vegetation data on the average have remained

relatively constant. Water-sampling data are within the limited recommended for unidentified radionuclides according to AEC Manual Chapter 0524. (Houser-ORNL)
W73-11908

ENVIRONMENTAL MONITORING IN THE VICINITY OF THE LOS ALAMOS SCIENTIFIC LABORATORY - CALENDAR YEAR 1972.
Los Alamos Scientific Lab., N. Mex.

Available from NTIS, Springfield, Va., as Rpt. No. LA-5184. $5.45 per copy, $1.45 microfiche. Report No. LA-5184, March 1973, J. E. Herceg, compiler. 54 p, 22 fig, 31 tab, 25 ref.

Descriptors: *Monitoring, *Nuclear powerplants, *Effluents, Atmospheric pollution, Water pollution, Soil contamination, Surface waters, Groundwater, Data collections, Meteorological data, Weather data, On-site data collections, Hydrologic data, Sediment, Geology, Food chains, Public health, Administrative agencies.

The environmental monitoring program in effect at the Los Alamos Scientific Laboratory for calendar year 1972 is described. Results are given of routine monitoring of radiation levels and levels of radioactive and nonradioactive contaminants in the Laboratory environs, including the atmosphere, the Los Alamos water supply, local surface and ground water, sediments, and soils. Concentrations and levels are compared with applicable guide values and with results obtained at other geographical locations and locally during other reporting periods. Descriptions are given of special programs aimed at describing the physical and biological processes involved in the transport of Laboratory-generated radionuclides in liquid waste disposal areas. There is also a description of an environmental survey of certain AEC-controlled land parcels, as well as geologic, seismic, and meteorological studies of the Los Alamos area. Technical notes discuss the use of the honeybee as a biological indicator of radiocontamination, a new gamma-ray pulse height analyzer system intended for field use, an automated meteorological data acquisition system, and the determination of salt in pine trees near Los Alamos roadways. (Houser-ORNL)
W73-11909

INVESTIGATION OF THE UTILITY OF PARALLEL PHOTOMETRIC ANALYSIS AS A NEW APPROACH FOR ENVIRONMENTAL DETERMINATIONS,
Tennessee Univ., Knoxville.
R. L. Coleman.
Available from NTIS, Springfield, Va., as TID-26302; $5.45 in paper copy; $1.45 in microfiche. Report TID-26302, August 1971. 113 p, 19 fig, 25 tab, 66 ref.

Descriptors: *Analytical techniques, *Water analysis, *Color reactions, *Phosphates, Trace elements, Sulfur compounds, Sulfates, Turbidity, Photometry, Chemical analysis, Spectrometers, Colimetry, Fluorometry, Chemical reactions, Theis equation, Equilibrium.

Time-saving non-equilibrium analyses were made using a photometric instrument that compared samples and standards virtually simultaneously, and also controlled factors such as the degree of completion of the analytical reaction, temperature, order and time of reagent addition, and mixing. Application to analysis of natural waters containing 0-14 microgram/ml of phosphate gave a standard deviation of about 0.04 microgram/ml with 500-microliter samples. Trace levels of sulfur dioxide in 50-ml containers were analyzed that would have been difficult with larger sample-volume requirements. Applications are also described to turbimetric analysis of sulfate and to bio- and chemiluminescence studies. (See also W72-11708) (Bopp-ORNL)
W73-11916

ANNOTATED BIBLIOGRAPHY ON 14-MEV NEUTRON ACTIVATION ANALYSIS,
European Atomic Energy Community, Brussels (Belgium). Bureau Eurisotop.
R. Van Grieken, and J. Hoste.
Available from NTIS, Springfield, Va., as EURISOTOP-65; $7.60 in paper copy, $1.45 in microfiche. Report EURISOTOP-65, 1972. 295 p, 820 ref.

Descriptors: *Bibliographies, *Neutron activation analysis, *Pollutant identification, Biota, Trace elements, Analytical techniques, Radioactivity techniques, Sediments, Soil analysis, On-site investigations, Documentation, Indexing.

The scope is limited to work using neutrons from deuteron bombardment of tritium. Related bibliographies and journals were scanned. Reprints were requested from laboratories publishing in this field. Reprints were also requested in connection with future editions. Indexing is by author, element determined, and matrix analyzed (including biologic materials, geologic materials-sediments and soils, in-situ analyses, and in-stream analyses of liquids). A standard format summarizes technical data for each entry. (Bopp-ORNL)
W73-11919

RADIOLOGICAL STATUS OF THE GROUNDWATER BENEATH THE HANFORD PROJECT - JULY-DECEMBER, 1971,
Battelle-Pacific Northwest Labs. Richland, Wash.
K. L. Kipp, Jr.
Available from NTIS Springfield, Va., as Report No BNWL-1680; $4.00 per copy, $1.45 microfiche. Report No BNWL-1680, Jan. 1973. 26 p, 3 fig, 6 tab, 5 ref.

Descriptors: *Nuclear powerplants, *Effluent, *Monitoring, *Assay, *Radioisotopes, Measurement, Groundwater, Radioactive tracers, Groundwater movement, Regulation, Standards, Tritium, Water pollution, Water pollution sources, Radioactive waste disposal, Public health.
Identifiers: Hanford site.

A report is prepared semi-annually to provide an evaluation of the status of groundwater contamination resulting from disposal of Hanford plant effluents. The data presented in this report were collected during the last six months of 1971. Of the wells that have been drilled to the groundwater on the Hanford project, about 200 are used for the routine surveillance of radionuclide movement through the sediments below the regional water table. The radionuclides Ruthenium-Rhodium and Tritium, as well as the nitrate ion, are readily transported by the groundwater and can be detected in groundwater at low concentrations relative to their respective drinking water standards. Therefore, these substances are used to trace the movement of contaminated groundwater away from the major disposal sites. The groundwater contamination pattern beneath Hanford at the present time can be divided into three source zones, based on the kinds and quantities of wastes disposed to ground at each location. Groundwater concentration data for these three source zones are presented. (Houser-ORNL)
W73-11923

ENVIRONMENTAL SURVEILLANCE AT HANFORD FOR CY-1972,
Battelle-Pacific Northwest Labs. Richland, Wash.
P. E. Bramson, and J. P. Corley.
Available from NTIS, Springfield, Va., as Report No BNWL-1727. $5.45 per copy, $1.45 microfiche. Report No BNWL-1727, April 1973. 72 p, 14 fig, 21 tab, 21 ref, 5 append.

Descriptors: *Environment, *Radioactivity, *Radioisotopes, *Measurement, *Assay, *Survey, *Water pollution, *Air pollution, *Soil contamination, Nuclear powerplants, Effluents, Water pollution sources, Public health, Columbia River, Food chains, Regulation, Standards.
Identifiers: *Hanford site, Concentration guide.

The 1972 Hanford Environmental Surveillance Program showed continued compliance of the Hanford contractors and their operations with applicable environmental standards. Samples of surface water, groundwater, air, foodstuffs, soil and vegetation were collected and analyzed for radioactivity. Columbia River water also received chemical and biological analysis. Additionally, measurements were made of river immersion exposure rate, surface exposure rate (1 meter above soil surface) and radionuclide deposition on soil surfaces and highways open to public access. Estimated 1972 dose to the average Richland resident from Hanford sources was less than 1 mrem (0.6% of the standard), about the same as for 1971. (Houser-ORNL)
W73-11924

A STUDY OF THE EXTRACTION AND DETERMINATION OF SOME ORGANO-MERCURY (II) COMPOUNDS,
Tennessee Univ., Knoxville.
J. A. Ealy.
Available from NTIS, Springfield, Va., as TID-26303; $5.45 in paper copy, $1.45 in microfiche. Report TID-26303, December 1971. 67 p, 14 fig, 13 tab, 35 ref.

Descriptors: *Gas chromatography, *Mercury, *Organic compounds, *Path of pollutants, Analytical techniques, Chromatography, Separation techniques, Solvent extractions, Food chains, Environmental effects, Public health.

The high toxicity of organo-mercury pollutants and the role of methylation in environmental pathways of Hg makes detection important. Two-stage extraction with benzene from aqueous biological phases, made 0.1-1 molar in iodide, gave about 96% yield. A gas-liquid chromatographic column (with on-column injection) separated 1-13 ng quantities of CH3HgCl, C2H5HgCl, and CH3C2H4HgCl. Attempts at liquid chromatography of organic-Hg (II) dithizonates on alumina gave inadequate separation. (Bopp-ORNL)
W73-11930

POTOMAC ESTUARY WASTEWATER TREATMENT PLANTS SURVEY.
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.
For primary bibliographic entry see Field 05D.
W73-12076

WATER QUALITY SURVEY OF THE POTOMAC ESTUARY EMBAYMENTS AND TRANSECTS.
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.

1970 Data Report No 28, 1973. 15 p.

Descriptors: *Water quality, *Water analysis, *Chemical analysis, *Potomac River, *Estuaries, Sampling, Analytical techniques, Inorganic compounds, Organic compounds, Water chemistry, Pollutant identification, Water temperature, Nutrients, Data collections.

During 1970 water quality studies were continued in the Potomac estuary watershed. The purpose of these surveys was to determine existing water quality. Analytical methods and results are presented for the following parameters: water temperature, light extinction, conductivity, salinity, total phosphorus, inorganic phosphorus, total

Kjeldahl nitrogen, nitrate+nitrite, ammonia, dissolved oxygen, total organic carbon, total carbon, and chlorophyll a. (Woodard-USGS)
W73-12077

SURVEY RESULTS OF THE CHESAPEAKE BAY INPUT STUDY.
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.

1969-70 Data Report No 31, 1973. 27 p.

Descriptors: *Water quality, *Water analysis, *Chemical analysis, *Chesapeake Bay, Sampling, Analytical techniques, Estuaries, Nutrients, Dissolved oxygen, Carbon, Biochemical oxygen demand, Chlorophyll, Pollutant identification, Water pollution sources, Sewage effluents.

In June 1969, a weekly sampling program was initiated of the Chesapeake Bay inputs. The purpose was to determine the nutrient loadings into the Chesapeake Bay from the six major drainage areas. The monitoring started with nine selected stations and increased to 12 in December 1969; surveillance terminated in August 1970. Chemical analyses were made for nutrients, dissolved oxygen, biochemical oxygen demand, carbon and chlorophyll a. Analytical methods and results are presented. (Woodard-USGS)
W73-12079

DETERMINATION OF CHLORIDE IN AQUEOUS SOIL EXTRACTS AND WATER SAMPLES BY MEANS OF A CHLORIDE-SELECTIVE ELECTRODE,
Norges Landbrukshoegskole, Vollebekk. Chemical Research Div.
A. R. Selmer-Olsen, and A. Oien.
Analyst, Vol 98, No 1167, p 412-415, June 1973. 1 fig, 2 tab, 5 ref.

Descriptors: *Water analysis, *Chlorides, *Electrodes, Colorimetry, Electrochemistry, Soil water, Chemical analysis.

The chloride contents of water samples and soil extracts may be determined with a chloride-selective electrode. The chloride content, at levels up to 100 mg per liter is determined in a solution that is 0.5 m with respect to ammonium nitrate and 0.03 m with respect to nitric acid. Comparison of this method with a colorimetric method showed no significant difference between the results obtained, but for water samples low in chloride (less than 3 mg per liter) the colorimetric method was more accurate. (Knapp-USGS)
W73-12088

DEOXYRIBONUCLEIC ACID BASE COMPOSITION AND TAXONOMIC POSITION OF GLUCOSE FERMENTING MARINE BACTERIA OF THE GENUS VIBRIO AND RELATED GENERA, (COMPOSITION EN BASES DE L'ADN ET POSITION TAXONOMIQUE DE BACTERIES MARINES FERMENTANT LE GLUCOSE, DU GENRE VIBRIO ET DES GENRES VOISINS),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
M. A. G. Bianchi.
Archiv fur Mikrobiologie, Vol 90, No 2, p 131-140, March 26, 1973. 1 fig, 3 tab, 16 ref.

Descriptors: *Systematics, *Separation techniques, Marine bacteria, Pathogenic bacteria, Pollutant identification, Cultures, Phenology.
Identifiers: *Vibrio, *Photobacterium, *Benecka, *DNA, Sample preparation, Aeromonas, Aeromonas spp.

DNA base composition of marine strains of genus Vibrio corroborate the results obtained by the adansonian method of classification. Comparisons of phenotypic and GC percent values of genera Photobacterium and Beneckea with the genus Vibrio show that differentiation between these three genera is not clear. Genus Vibrio can be separated in four groups. The first contains free-living marine strains. The second group includes the marine strains pathogenic to poikilothermic animals. The third group is composed of strains pathogenic to poikilothermic and homeothermic animals. The last group is made up of strains which, contrary to the other groups, have shown no specific requirement of sodium for growth. Each group has a typical ecologic localization. (Little-Battelle)
W73-12090

ON DOUBLE SAMPLING FOR STRATIFICATION AND ANALYTICAL SURVEYS,
Manitoba Univ., Winnipeg.
J. N. K. Rao.
Biometrika, Vol 60, No 1, p 125-133, April 1973. 8 ref.

Descriptors: *Statistical methods, *Estimating, Stratification, Sampling.
Identifiers: *Double sampling, *Variance, Non-response theory.

A simple method of double sampling for stratification is proposed and the classical non-response theory is obtained as a special case. The method leads to simple solutions for the optimal design of analytical surveys involving comparison of group means, when the groups are not identifiable in advance. (Little-Battelle)
W73-12092

SHORTCUTS TO SMALL-SAMPLE STATISTICS PROBLEMS,
Ethyl-Corp., Ferndale, Mich. Research and Development Dept.
P. F. Jackisch.
Chemical Engineering, Vol 80, No 13, p 107-110, June 11, 1973. 5 ref.

Descriptors: *Data processing, Statistical methods, Charts, Quality control.
Identifiers: *Nomographs, *Data scatter, Significance, Standard deviation.

Using the nomographs presented, it is possible to easily and rapidly determine the scatter in a set of data, significant differences between two sets of data, and whether some data should be discarded. The method is useful when the number of data points does not exceed 20. Sample applications of the procedure are included. (Little-Battelle)
W73-12093

A FLEXIBLE, LOW COST ALPHANUMERIC DISPLAY,
Institutal, Politehnic Bucuresti (Rumania).
P. D. Dimo, A. J. Gayraud, and N. N. Popovici.
Computer Design, Vol 12, No 6, p 77-82, June 1973. 8 fig, 3 ref.

Descriptors: *Electronic equipment.
Identifiers: *Data displays, *Alphanumeric displays.

Character generation techniques, character generators, and control logic for alphanumeric displays are discussed. Design criteria are given to aid in the selection of low cost displays. (Little-Battelle)
W73-12094

FORMAT CONVERSION USING A FIFO BUFFER,
Unidata Ltd., London (England).
C. Abellanas.
Computer Design, Vol 12, No 6, p 84-88, June 1973. 2 fig, 2 tab.

Descriptors: *Electronic equipment, *Data processing.
Identifiers: *Format conversion.

Asystem is described which allows for a number of different format conversions from an M-line bus to an N-line bus which is limited only by the length of the storage register. The converter's design is based on a special purpose first-in/first-out memory (FIFO) which has the ability to shift its information sideways. Operation of the system is described. (Little-Battelle)
W73-12095

A ROTATING RING-HEMISPHERICAL ELECTRODE FOR ELECTROANALYTICAL APPLICATIONS,
General Motors Corp., Warren, Mich. Electrochemistry Dept.
D-T. Chin.
Journal of the Electrochemical Society, Vol 120, No 5, p 631-635, May 1973. 6 fig, 7 ref.

Descriptors: *Electrochemistry, *Copper, *Iron, Heavy metals, Design, Aqueous solutions.
Identifiers: *Cyclic voltammetry, *Rotating ring-hemispherical electrode, Collection efficiency, Ion selection electrodes, Ferricyanide, Cupric chloride.

A study has been made of the combination of a rotating hemispherical electrode with aring electrode of a larger radius for use in investigations of reaction intermediates. Cyclic voltammetry is an acid copper solution was used to test the feasibility of the combination, and a ferricyanide/ferrocyanide redox reaction was used to measure the collection efficiency at the ring electrode. The collection efficiency was independent of the rotational speed in laminar flow, and its value was comparable to that obtained from the rotating ring-disk electrode theory. The results indicate that the ring-disk theory can be used as a rough approximation for the ring hemisphere electrode if the inner radius of the ring electrode is a minimum of 1.08 times the radius of the hemispherical electrode. Easy replacement of the central hemispherical electrode is a big advantage of this new geometry. This offers electrochemists an alternative choice where the use of a ring-disk electrode would fail to give a meaningful result and where frequent replacement of the disk electrode is needed. (Little-Battelle)
W73-12096

A POLYTHENE GRAPHITE ELECTRODE FOR VOLTAMMETRY,
Rome Univ. (Italy). Instituto di Chimica Analitica.
M. Mascini, F. Pallozzi, and A. Liberti.
Analytica Chimica Acta, Vol 43, No 1, p 126-131, March 1973. 5 fig, 2 tab, 8 ref.

Descriptors: *Iodides, *Oxidation-reduction potential, Electrodes, Ions.
Identifiers: *Ion selective electrodes, *Polyethylene graphite electrodes, *Voltammetry, *Cerium, *Hexacyanoferrate, Current-potential curves.

Polyethylene graphite electrodes were made by mixing spectral graphite with finely powdered thermoplastic polymer (polyethylene or methacrylic esters), placing the mixture in a mold, and thermosealing to a rigid polyethylene tube. Internal electrical contact was ensured by mercury. Current-potential curves were recorded in various supporting electrolytes such as KNO3, KC1, Na2SO4, H2SO4, HC1, HNO3, and HC104. Results of voltammetry with iodide, hexacyanoferrate, and cerium were also recorded. Reproducibility of results with the electrodes was better than 1 percent from day to day. (Little-Battelle)e
W73-12097

ACCUMULATION OF DIELDRIN IN AN ALGA (SCENEDESMUS OBLIQUUS), DAPHNIA MAGNA AND THE GUPPY (POECILIA RETICULATA),
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 05B.
W73-12098

SOME PROPERTIES OF PROBABILITY LATTICE SAMPLING,
California Univ., Los Angeles. Graduate School of Management.
R. J. Jessen.
Journal of the American Statistical Association, Vol 68, No 341, p 20-28, March 1973. 10 tab, 25 ref.

Descriptors: *Model studies, *Properties, Estimating.
Identifiers: *Probability lattice sampling, *Analysis of variance, Estimators.

The accuracy of three estimators of sampling variance using nonreplacement probability lattice samples was determined empirically on a microuniverse. A simple split-sample scheme, although biased, was superior to the unbiased Horvitz-Thompson and Yater-Grundy estimators. A weighted ANOVA type of model for representing two-way universes with unequal cell sizes is presented and tested empirically to determine how well it can account for sources of sampling variability using 0, 1 and 2-way controls with EP (equal probability) and PNR (probability proportional to size with non-replacement) samples. (Holoman-Battelle)
W73-12099

AN EVALUATION OF TEN PAIRWISE MULTIPLE COMPARISON PROCEDURES BY MONTE CARLO METHODS,
Illinois Univ., Urbana. Dept. of Agronomy.
S. G. Carmer, and M. R. Swanson.
Journal of the American Statistical Association, Vol 68, No 341, p 66-74, March 1973. 10 tab, 17 ref.

Descriptors: *Statistical methods, *Computer models, Testing procedures, Data processing.
Identifiers: *Error rates, *Decision rates, *Analysis of variance, *Least significant difference, Scheffe's test, Tukey's test, Student-Newman-Keuls test.

Computer simulation techniques were used to study the Type I and Type III error rates and the correct decision rates for ten pairwise multiple comparison procedures. Results indicated that Scheffe's test, Tukey's test, and the Student-Newman-Keuls test are less appropriate than either the least significant difference with the restriction that the analysis of variance F value be significant at alpha equal .05, two Bayesian modifications of the least significant difference, or Duncan's multiple range test. Because of its ease of application, many researchers may prefer the restricted least significant difference. (Little-Battelle)
W73-12100

BAYESIAN ACCEPTANCE-SAMPLING SCHEMES FOR TWO-SIDED TESTS OF THE MEAN OF A NORMAL DISTRIBUTION OF KNOWN VARIANCE,
Vidyodaya Univ. of Ceylon, Nugegoda. Dept. of Mathematics.
R. A. Dayananda, and I. G. Evans.
Journal of the American Statistical Association, Vol 68, No 341, p 131-136, March 1973. 14 ref.

Descriptors: *Statistical methods, Sampling.
Identifiers: *Acceptance sampling, *Sample size, *Hypothesis testing.

The problem of deciding whether the mean of theta of a normal distribution of known variance lies in a specified finite interval (theta minus, theta plus) is discussed. Consideration is given to prior information on theta and to quadratic and piecewise linear utility structures. Computer-aided methods are described for obtaining the optimal decision rule given a sample of observations and for obtaining the optimal sample size when the sampling cost is a linear function of the sample size. Some simpler approximate methods are also described. (Little-Battelle)
W73-12101

HETEROGENEOUS-SITE GLASS MEMBRANE POTENTIALS-A SOLID-STATE APPROACH,
North Carolina Univ., Chapel Hill. Lab. of Chemistry.
R. P. Buck.
Analytical Chemistry, Vol 45, No 4, p 654-665, April 1973. 11 fig, 2 tab, 63 ref.

Descriptors: *Electrochemistry, *Electrical properties, *Model studies, *Aqueous solutions, *Hydrogen ion concentration, Mathematical studies, Mathematical models.
Identifiers: *Glass electrodes, Ion selective electrodes, Membrane electrodes, Accuracy.

Previously no single potential response function for glass electrodes accounted for the step-wise response of heterogeneous-site glass in mixed electrolytes (varying pH at constant pM). A new theory encompasses both of Nicolsky's variant ion exchange theories and Eisenman's n-type non-ideal behavior by introducing the assumption that only a fraction of cations in a glass membrane are mobile and contribute to the diffusion potential. Mobile defects, which may be few or nearly all cations, are presumed to be in equilibrium with lattice-like ions, defect sites, and vancancies. At low Al203 levels in a typical Na20-Al20-Si02 glass, two Nernstian pH regions are predicted, while at higher levels a shoulder followed at high pH by half Nernstian response is predicted. Experimental data are used to test theory. In the limit of zero heterogeneity, a new expression for pH electrode response is found which fits existing data and gives another meaning to n-type non-ideal behavior. (Little-Battelle)
W73-12102

MORPHOLOGICAL, BIOCHEMICAL, AND GROWTH CHARACTERISTICS OF PSEUDOMONAS CEPACIA FROM DISTILLED WATER,
Center for Disease Control, Phoenix, Ariz. Environmental Microbiology Section.
L. A. Carson, M. S. Favero, W. W. Bond, and N. J. Petersen.
Applied Microbiology, Vol 25, No 3, p 476-483, March 1973. 4 fig, 1 tab, 18 ref.

Descriptors: *Growth rates, *Isolation, *Pollutant identification, Cytological studies, Pesticide toxicity, Aerobic bacteria, Risistance, Cultures, Water temperature, Antibiotics (Pesticides).
Identifiers: *Distilled water, *Pseudomonas cepacia, *Cell morphology, *Biochemical characteristics, Bacterial physiology, Biochemical tests, Survival, Ampillicin, Polymyxin-B, Colistin, Gentamicin, Cephalothim, Cephaloridine, Chloramphenicol, Sulfonamide, Nalidixic acid, Tetracycline, Kanamycin.

Studies were conducted on three strains of Pseudomonas cepacia isolated and maintained in distilled water and on a laboratory-subcultured strain transferred to distilled water. Optimum growth rates and maximum population yields of the four strains in distilled water were obtained at 37 C, although high population levels (1,000,000 - 10,000,000/ml) were reached and maintained over extended incubation periods at temperatures from 18C to 42C. Two strains were able to grow in distilled water at temperatures ranging from i2C to 48C and to survive 48 h and 21 days at 50C and 10C, respectively. Cells from distilled water cultures inoculated into Trypticase soy broth showed an immediate two- to three-log drop at upper and lower temperature limits; survivors were able to initiate logarithmic growth. Results obtained in morphological, biochemical, and antibiotic tests affirmed the strain differences noted in growth studies. (Holoman-Battelle)
W73-12103

IDENTIFICATION OF STAPHYLOCOCCUS AUREUS BY SIMULTANEOUS USE OF TUBE COAGULASE AND THERMONUCLEASE TESTS,
Sacramento Medical Center, Calif. Clinical Microbiology Lab.
A. L. Barry, R. V. F. Lachica, and F. W. Atchison.
Applied Microbiology, Vol 25, No 3, p 496-497, March 1973. 1 tab, 4 ref.

Descriptors: *Pollutant identification, *Separation techniques, Cultures, Quality control, Pathogenic bacteria.
Identifiers: *Staphylococcus aureus, Accuracy, Tube coagulase tests, Thermonuclease tests.

The toluidene blue deoxyribonucleic acid (DNA) agar (TDA) technique was adapted to permit detection of thermonuclease (heat-stable nuclease) at the same time that a coagulase test is performed to eliminate possible errors in distinguishing Staphylococcus aureus from other Micrococcaceae. Isolated colonies were grown on brain heart infusion (BHI) broth at 35 C for 2-6 hours, divided into three parts, one for coagulase tests, one for thermonuclease tests, and one for growth if retesting were necessary. Experience using the tests showed that valid discrepancies between two tests are rare enough to permit the use of one test as a control of the other. (Little-Battelle)
W73-12104

EFFECT OF ACETATE UPON THE FORMATION OF ACETOIN IN KLEBSIELLA AND ENTEROBACTER AND ITS POSSIBLE PRACTICAL APPLICATION IN A RAPID VOGES-PROSKAUER TEST,
Ullevaal Hospital, Blindern (Norway). Dept. of Microbiology.
K. Bryn, J. C. Ulstrup, and F. C. Stormer.
Applied Microbiology, Vol 25, No 3, p 511-512, March 1973. 12 ref.

Descriptors: *Separation techniques, Cultures, Pollutant identification.
Identifiers: *Enterobacter, *Klebsiella, *Acetates, Voges-Proskauer test, Biochemical tests.

Acetate stimulates the formation of acetoin during 1-h incubation of Voges-Proskauer-positive strains of Klebsiella and Enterobacter. Of these organisms, 124 of 126 strains were recognized as positive in the presence of acetate, and 106 were recognized as positive in its absence. (Little-Battelle)
W73-12106

DISCREPANCIES IN THE ENUMERATION OF ESCHERICHIA COLI,
North Carolina State Univ., Raleigh. Dept. of Food Science.
B. Ray, and M. L. Speck.
Applied Microbiology, Vol 25, No 4, p 494-498, April 1973. 1 fig, 7 tab, 11 ref.

Descriptors: *E. coli, *Foods, *Cultures, *Pollutant identification, Enteric bacteria, Coliforms, Methodology, Inhibition.
Identifiers: *Enumeration, *Most probable number test, *Pour plate method, Culture media, Selective media, Surface-overlay method, Trypticase soy agar, Violet red-bile agar, Brilliant Green-bile broth, Lauryl sulfate broth.

Stationary-phase cells of Escherichia coli from stock cultures, reconstituted nonfat dry milk, meat broth, crab meat and liquid whole egg, were enumerated by the pour plate method on Trypticase soy agar containing 0.3 percent yeast extract (TSYA), violet red-bile agar, and desoxycholate-lactose agar, and by the most-probable-number method in Brilliant Green-bile broth and lauryl sulfate broth. Maximum counts were assumed to be those on TSYA. In general, numbers detected were lower with the selective solid media and higher with the selective liquid media. Inhibitory effects, especially on selective solid media varied with the strains of E. coli. The lower detection on selective solid media was partly due to the stress induced in some cells by the temperature of the melted media used in the pour plate method. These cells apparently failed to repair and form colonies in the selective media. Improved detection on the selective solid media was achieved by using 1 percent nonfat milk solids, 1 percent peptone, or 1 percent MgSO4.7H2O in the dilution blanks. Higher detection on selective agar media was effected by surface plating or by surface overlay plating of the cells. The surface-overlay method appeared to be superior for the direct enumeration of E. coli in foods. (Holoman-Battelle)
W73-12107

EXPERIENCE WITH AN IMAGE-ANALYZING COMPUTER IN VIRUS PLAQUE MEASUREMENTS,
Arzneimittelforschung G.m.b.H., Vienna (Austria).
W. Scheirer.
Applied Microbiology, Vol 25, No 4, p 641-643, April 1973. 3 fig, 2 tab, 3 ref.

Descriptors: *Measurement, *Viruses, *Pollutant identification, Laboratory equipment, Research equipment, Automatic control, Automation, Cultures.
Identifiers: *Image-analyzing computer, *Plaque counts, Plaque-reduction tests, Vesiscular stomatitis virus, Cowpox virus.

A description is given of the Imanco-Quantimet 720 image-analyzing computer which has been used for counting virus plaques in different test systems. With this apparatus, an object is picked up by a TV camera and electronically resolved into 500,000 picture spots. These are scanned row by row for difference in gray density. The gray difference, which is necessary to detect the plaques against the stained cell monolayer, must be determined for each test series. The plaques detected by the instrument can also be discriminated by size, as measured in picture spots. The results can be printed out either as the number of plaques as discriminated by a certain gray difference, as the total area of plaques, or as the sum of all plaque diameters. In determining the possibility of using this apparatus in virology, three test systems were used: (1) mouse L-929 cells challenged with vesiscular stomatitis virus, strain Indiana; (2) chicken embryo fibroblasts challenged with cowpox virus, strain Brighton; and (3) human phimosis cells challenged with VSV. System 1 presented no problems and the measurements obtained by hand counting corresponded well with computer results. Adjustments were made for optimal results with system 2 but good agreement was found with hand-counting values. Useful results were not obtained with system 3. The image-analyzing computer is most helpful for large screening programs, involving plaque-reduction tests, because of the extremely fast and reliable plaque-number determinations. (Holoman-Battelle)
W73-12108

SPECIFIC IDENTIFICATION OF ENTEROVIRUSES BY IMMUNO-ELECTRON MICROSCOPY USING A SERUM-IN-AGAR DIFFUSION METHOD,
Toronto Univ. (Ontario). School of Hygiene.
N. Anderson, and F. W. Doane.
Canadian Journal Microbiology, Vol 19, No 5, p 585-589, May 1973. 4 fig, 3 tab, 7 ref.

Descriptors: *Pollutant identification, *Methodology.
Identifiers: *Immuno-electron microscopy, *Enterovirus, *Serum-in-agar diffusion method, Echovirus, Agar-diffusion technique, Coxsackievirus, Poliovirus, Serotypes, Sensitivity.

Rapid type-specific identification of enteroviruses was performed by immuno-electron microscopy on crude cell-culture isolates, using an agar-diffusion technique in which the typing sera were incorporated in the agar. Seventeen virus samples which consisted of 11 different enterovirus types showed no cross reaction on when tested against 15 enterovirus antisera. Specific virus identification, based on the presence of visible antigen-antibody complexes, was not dependent on optimal dilutions of antiserum, but could be achieved with a variety of dilutions. The minimum amount of virus that could be detected by this method was about 100 times less than that detectable by electron microscopy in the absence of antiserum. (Holoman-Battelle)
W73-12109

ISOLATION AND CHARACTERIZATION OF THERMOSENSITIVE ESCHERICHIA COLI MUTANTS DEFECTIVE IN DEOXYRIBONUCLEIC ACID REPLICATION,
Columbia University, New York. Dept. of Biological Sciences.
J. A. Wechsler, V. Nusslein, B. Otto, A. Klein, and F. Bonhoeffer.
Journal of Bacteriology, Vol 113, No 3, p 1381-1388, March 1973. 7 tab, 9 ref.

Descriptors: *E. coli, Temperature, Cultures, Separation techniques.
Identifiers: *Isolation, *Characterization, *Autoradiography, *DNA replication, Mutants, Biochemistry, DNA, Culture media, Complementation tests.

Thermosensitive deoxyribonucleic acid replication-defective mutants have been isolated by using an autoradiographic selection method. The mutants have been analyzed genetically and biochemically. Some of the mutants show thermosensitivity of in vitro deoxyribonucleic acid replication. These can be classified into three groups according to their behavior in in vitro complementation assays. This classification is congruent with that obtained by genetic mapping by using cotransduction frequencies with selected markers in P1 transduction analysis. (Little-Battelle)
W73-12110

GRAPHS, TABLES AND DISCUSSION TO AID IN THE DESIGN AND EVALUATION OF AN ACCEPTABLE SAMPLING PROCEDURE BASED ON CUMULATIVE SUMS,
Sandia Labs., Albuquerque, N. Mex.
R. R. Prairie, and W. J. Zimmer.
Journal of Quality Technology, Vol 5, No 2, p 58-66, April 1973. 8 fig, 3 tab, 3 ref.

Descriptors: *Sampling, *Statistical methods, Quality control, Testing procedures.
Identifiers: *Acceptance sampling, *Attributes.

An acceptance sampling procedure for attributes inspection proposed by Beattie seems well suited for situations when production is continuous, sampling is destructive, a constant sampling rate is required, and discrimination between two quality levels is required with a small sample size. The Beattie procedure is described, the underlying mathematics are presented, strengths and weaknesses are disclosed and graphs are presented for determining a plan. (Little-Battelle)
W73-12111

SOME EXACT TESTS OF HYPOTHESES ABOUT GRUBBS'S ESTIMATORS,
Agricultural Research Council, Edinburgh (Scotland). Unit of Statistics.
G. K. Shukla.
Biometrics, Vol 29, No 2, p 373-377, June 1973. 7 ref.

Descriptors: *Instrumentation, *Statistical methods, Measurement, Quality control, Testing procedures.
Identifiers: *Hypothesis testing, *Precision.

When two instruments or techniques are used to measure the same item, the measurement precisions may be estimated using a method proposed by Grubbs (1948). Certain tests given by earlier authors are generalized. Using this general result, some exact tests of certain hypothesis are obtained for which only approximate results were available. The results can also be used to construct exact confidence intervals for the relative precision of two instruments. (Little-Battelle)
W73-12112

THE EFFECTS OF AMMONIUM AND PHOSPHATE ENRICHMENTS ON CHLOROPHYLL A, PIGMENT RATIO AND SPECIES COMPOSITION OF PHYTOPLANKTON OF VINEYARD SOUND,
Marine Biological Lab., Woods Hole, Mass.
Boston Univ. Marine Program.
For primary bibliographic entry see Field 05C.
W73-12116

DELAYED-INCUBATION MEMBRANE-FILTER TEST FOR FECAL COLIFORMS,
Environmental Protection Agency, Cincinnati, Ohio. Water Supply Research Lab.
R. H. Taylor, R. H. Bordner, and P. V. Scarpino.
Applied Microbiology, Vol 25, No 3, p 363-368, March 1973. 5 tab, 14 ref.

Descriptors: *Pollutant identification, *Monitoring, Water quality, Water pollution, Waste water pollution, Water pollution sources, Methodology, Bioindicators, Ohio River.
Identifiers: *Fecal coliforms, *Delayed incubation membrane filter test, Date interpretation, Culture media, Five Mile Creek (Ohio), Licking River (Ohio), Mill Creek (Ohio), Burnet Woods Lake (Ohio), VFC holding medium.

A delayed-incubation membrane-filter technique for fecal coliforms was developed and compared with the immediate fecal coliform test described in 'Standard Methods for the Examination of Water and Wastewater' (13th ed., 1971). Laboratory and field evaluations demonstrated that the delayed-incubation test, with the use of the proposed vitamin-free Casitone holding medium, produces fecal coliform counts which very closely approximate those from the immediate test, regardless of the source or type of fresh-water sample. Limited testing indicated that the method is not as effective when used with saline waters. The delayed-incubation membrane-filter test will be especially useful in survey monitoring or emergency situations when the standard immediate fecal coliform test cannot be performed at or near the sample site or when time and temperature limitations for water sample storage can be met. The procedure can also be used for analyzing the bacterial quality of water or waste discharge by a standardized procedure in a central examining laboratory remote from the sample source. (Holoman-Battelle)
W73-12120

TYPING OF SALMONELLA WELTEVREDEN STRAINS BY MEANS OF LYSIS PATTERNS OF SYMBIOTIC PHAGES,
Haryana Agricultural Univ., Hissar (India). Dept. of Veterinary Bacteriology and Hygiene.
D. N. Garg, and I. P. Singh.
Antonie van Leeuwenhoek, Vol 39, No 1, p 41-50, 1973. 5 tab, 2 ref.

Descriptors: *Bacteriophage, Hosts, Bioindicators, Isolation, Aerobic bacteria, Spatial distribution, Sewage, Water pollution, Oysters, Crustaceans, Birds, Poultry, Sea water, Reptiles, Mammals, Frogs, Human diseases, Enteric bacteria.
Identifiers: *Phage typing, *Salmonella weltevreden, *Lysogenicity, *Characterization, Biochemical characteristics, Serotypes, Culture media, Distilled water, Biochemical tests, Lysogeny.

A typing scheme for Salmonella weltevreden using the lysogenicity and lysis patterns of their carried phages is presented. Six strains of S. weltevreden were selected for use as indicator strains for recognizing the lysis patterns of the carried phages. Two hundred and forty-five strains were examined and 207 were grouped in concurrence with the 15 lysis patterns obtained out of 64 theoretically possible. Lysis pattern I (all 6 indicator strains lysed by the carried phage) included 24.5 percent of the strains. Thirty-eight strains (15.5 percent) were grouped as untypable because their lysates did not lyse any of the indicator strains. No correlation could be established between the lysis patterns of carried phages and the host and geographic distribution of S. weltevreden. (Holoman-Battelle)
W73-12121

ISOLATION OF NEW METHANOL-UTILIZING BACTERIA AND ITS THIAMINE-REQUIREMENT FOR GROWTH,
Sanraku-Ocean Co. Ltd., Fujisawa (Japan). Central Research Lab.
K. Kouno, T. Oki, H. Nomura, and A. Ozaki.
Journal of General and Applied Microbiology, Vol 19, No 1, p 11-21, February 1973. 2 fig, 1 tab, 25 ref.

Descriptors: *Isolation, *Nutrient requirements, *Environment, Sewage, Activated sludge, Humus, Mud, Vitamins, Organic compounds, Cultures, Pollutant identification, Aerobic bacteria.
Identifiers: *Methanol, *Biochemical characteristics, *Methanomonas methylovora, *Methanol bacteria, *Thiamine, Substrate utilization, Culture media, Petroleum refinery, Characterization, Biochemical tests, Bacterial physiology, Cell morphology, DNA.

Approximately 0.1 g of soil, activated sludge, sewage, compost, humus, and materials around a petroleum refinery were placed in a Monod shaking tube containing 10 ml of basal methanol medium. The tube was incubated with reciprocal shaking at 28-30 degrees for 3 days after several subcultures, methanol-utilizing bacteria were plated and picked up after incubating for 5 days at 28 degrees. Nutrient agar and other media enriched with peptone were used to detect the presence of bacteria capable of utilizing carbon sources other than methanol. Vitamin and amino acid requirements were determined by using a minimum medium omitting yeast extract, biotin, and thiamine hydrochloride from the basal medium. These nonpigmented bacteria were capable of growing only on methanol and showed no growth on ordinary nutrient media. They were identified as a new species, Methanomonas methylovora. The organisms are gram-negative, non-sporeforming rods, 0.4 to 0.7 micron by 1.0 to 4.0 microns in size, having a single polar flagellum. GC content of DNA is 51.2 to 53.6 percent. Some of them required a relatively high concentration of thiamine as an essential factor for cell growth, and produced an intracellular yellow pigment on methanol-containing agar medium. (Holoman-Battelle)
W73-12122

FATTY ACID FINGERPRINTS OF STREPTOCOCCUS MUTANS GROWN IN A CHEMOSTAT,
Manchester Univ. (England). Dept. of Bacteriology and Virology.
D. B. Drucker, C. J. Griffith, and T. H. Melville.
Microbios, Vol 7, No 25, p 17-23, January 1973. 1 fig, 2 tab, 30 ref.

Descriptors: Cultures, Pollutant identification, Gas chromatography, Streptococcus, Pathogenic bacteria.
Identifiers: Streptococcus mutans, Gas liquid chromatography, Chemostat, Sample preparation, Fatty acids, Characterization, Culture media, Fingerprinting, Chromatograms.

Streptococcus mutans D282 and Streptococcus mutans JC2 were grown in a chemostat, the latter organism being grown under various experimental conditions. Freeze-dried cells were methylated and methyl fatty acid esters examined by gas-liquid chromatography to determine the effect of experimental growth parameters on chemotaxonomic GLC fingerprints. Changes in experimental conditions slightly altered the JC2 fingerprint, especially oxygenation which resulted in unsaturated fatty acid production. Changes in the JC2 fingerprints were less than the difference in fingerprints for JC2 and D282 grown under identical conditions. Little-Battelle
W73-12123

PARTIAL CHARACTERIZATION OF MYCOBACTERIOPHAGE R1 PARTICLES SURVIVING CHLOROFORM TREATMENT,
Ohio State Univ., Columbus. Dept. of Medical Microbiology.
M. A. Fleer, and B. U. Bowman.
Microbios, Vol 7, No 25, p 37-44, January 1973. 5 fig, 16 ref.

Descriptors: *Cultures, Pollutant identification, Enzymes, Bacteriophage, Viruses.
Identifiers: *Mycobacteriophage, *Characterization, *Survival, *Inactivation, Phages, Chloroform, Mycobacterium smegmatis.

Approximately 99 percent of mycobacteriophage R1 is inactivated by chloroform treatment. Phage R1 surviving chloroform treatment (chloroform survivors) form smaller plaques than untreated phage when both are plated and compared on mycobacterium smegmatis ATCC 607. However, when progeny of chloroform survivors are picked and plated they form normal plaques. DNase and RNase had essentially no effect on either untreated phage or chloroform survivors. Trypsin had no effect on untreated phage but completely inactivated chloroform survivors. Anti-R1 serum inactivated both untreated phage and chloroform survivors. However, chloroform survivors were inactivated to a greater extent. Chloroform survivors appear to be different from native phage R1 and the differences may be related to the infectious process of the virion-host cell system. (Little-Battelle)
W73-12124

AMMONIA ASSIMILATION IN BLUE-GREEN ALGAE,
California Univ., Berkeley. Dept. of Bacteriology and Immunology.
For primary bibliographic entry see Field 05B.
W73-12125

OCCURRENCE AND DISTRIBUTION OF CYANOPHAGES IN PONDS, SEWAGE AND RICE FIELDS,
Central Rice Research Inst., Cuttack (India). Dept. of Blue-Green Algae.
P. K. Singh.
Archiv fur Mikrobiologie, Vol 89, No 2, p 169-172, February 5, 1973. 2 tab, 11 ref.

Descriptors: *Cyanophyta, *Plant viruses, *Nuisance algae, Ponds, Sewage, Rice, Cultivated lands, Aquatic algae, Aquatic plants, Pollutant identification, Water sampling, Aquatic habitats.
Identifiers: *Plectonema boryanum, *Cyanophages, Culturing techniques, Microcystis, Anabaenopsis, Phormidium, Oscillatoria.

Observations have been made on the occurrence and distribution of cyanophages active against the blue-green alga Plectonema boryanum together with fluctuations of blue-green algae in permanent freshwater ponds, sewage and rice fields. Water samples were collected monthly and the genera of blue-green algae present in them identified. The samples were filtered, treated with chloroform, mixed with a concentrated culture of P. boryanum and plated by the double agar layer technique (Adams, 1959). Plaques were counted on the third and seventh day of plating, further isolated, multiplied on the alga, and filtered through 0.45-micron millipore filters. Two distinct types of cyanophages, i.e., clear (virulent) and turbid (lysogenic) plaque-forming strains were observed in the natural habitat. The genera of algae observed most were Microcystis, Anabaenopsis, Phormidium and Plectonema. The sewage main drain contained mostly species of Phormidium and Oscillatoria. Presence of cyanophages in ponds and variation in their titre indicated that cyanophages might affect the blue-green algal population in natural habitats. The occurrence of high titre of viruses showed that blue-green algae in rice fields are infected by them. (Holoman-Battelle)
W73-12126

CHARACTERIZATION OF THIOBACILLUS SPECIES BY GAS-LIQUID CHROMATOGRAPHY OF CELLULAR FATTY ACIDS,
Rochester Univ., N.Y. Dept. of Biology.
A. D. Agate, and W. Vishniac.
Archiv fur Mikrobiologie, Vol 89, No 3, p 257-267, February 9, 1973. 5 fig, 2 tab, 14 ref.

Descriptors: *Separation techniques, Gas chromatography, Thiobacillus ferrooxidans, Pollutant identification, Cultures.
Identifiers: *Characterization, *Gas liquid chromatography, *Thiobacillus ssp, Chromatograms, Culture media.

Fatty acids of 18 strains representing 10 species of Thiobacillus were extracted from whole cells and examined as methyl esters by gas-liquid chromatography. Both visual and quantitative comparison of the resulting chromatograms for the presence and relative amounts of major peaks allowed rapid differentiation between such closely related species as Thiobacillus neapolitanus and T. thioparus and of eight other species. Except for a feature common to all thiobacilli tested, T. thiooxidans, T. neapolitanus and T. thioparus each possessed a characteristic fatty acid methyl ester profile that was exhibited by all the strains of that species. Hence, the thiobacilli could be divided into three distinct groups. It was possible to use the gas-liquid chromatographic patterns of the cellular fatty acids for rapid identification or grouping of these microorganisms since the fatty acid composition of the genus Thiobacillus thus appeared to be of taxonomic significance. (Little-Battelle)
W73-12127

A SUBMERSIBLE SPECTRORADIOMETER AND DATA ACQUISITION SYSTEM,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
W. S. Duval, T. J. Brown, and G. H. Geen.
Journal of the Fisheries Research Board of Canada, Vol 30, No 2, p 313-316, February 1973. 4 fig, 1 ref.

Descriptors: *Instrumentation, *Data processing, *On-site data collections, *Laboratory tests, *Design data, Light, Calibrations, Aquatic environment, Optical properties, Water temperature.
Identifiers: *Spectroradiometer, *Performance evaluation, *Submersible light meter, Detection limits, Sensitivity, Reproducibility, Marine environment, Spectral data, Optical systems.

A submersible light meter that measures and records irradiance versus wavelength over the

range 400-750 nm is described. A data acquisition system coupled to the radiometer permits collection and processing of large numbers of field observations. The incident spectrum is determined by an optical system incorporating a wedge interference filter monochromator and photodiode. Recorded data are converted to spectra irradiance (microW/sq cm/nm) at 5-nm intervals by applying standard lamp calibration and immersion factor corrections. Minimum detectable radiation varies from 0.05 to 0.016 microW/sq cm/nm depending on wavelength. Response of the meter is not affected by temperature in the range of 3.5-23.0 C and angular dependence of the light collector follows Lambert's Cosine Law for incident angles less than 55 degrees from the vertical. Changes in the spectral composition of incident light with depth are demonstrated for two lakes. (Holoman-Battelle)
W73-12135

THE LIFE HISTORY OF THE ALDERFLY, SIALIS AEQUALIS BANKS, IN AN ACID MINE STREAM,
Marshall Univ., Huntington, W. Va. Dept. of Biological Sciences.
J. E. Woodrum, and D. C. Tarter.
The American Midland Naturalist, Vol 89, No 2, p 360-368, April 1973. 3 fig, 20 ref.

Descriptors: *Life history studies, *Acid streams, Growth rate, Growth stages, Food habits, Life cycles, Acid mine water, Benthos, Aquatic insects.
Identifiers: *Alderflies, Sialis aequalis Twelvepole Creek (West Virginia), Megaloptera.

The life history of the alderfly, Sialis aequalis Banks, was studied intensively in an acid mine stream, Camp Creek of Twelvepole Creek, Wayne County, West Virginia, Between July 1970 and June 1971. Alderfly larvae are detritivorous, supplementing their diet with chironomid larvae in summer and autumn. Length frequency distributions indicate that larvae require 1 year to complete the life cycle. The larvae attain their greatest growth rate from June to July (83 percent). The entire larval population required 2-6 days for departure from the stream. Pupation began in a moist sandbank in mid-March and lsted 4-5 weeks. Emergence of adults began in late April and reached a peak in early May. Total egg counts from 10 females ranged from 402 to 818 (mean, 657). Adult life span was the 2 weeks in nature and ranged from 1 to 7 days under laboratory conditions (mean, 5.7 days). Adults do not feed. (Little-Battelle)
W73-12136

FEASIBILITY OF REMOTE DETECTION OF WATER POLLUTANTS AND OIL SLICKS BY LASER-EXCITED RAMAN SPECTROSCOPY,
Rhode Island Univ., Kingston. Dept. of Chemistry.
M. Ahmadjian, and C. W. Brown.
Environmental Science and Technology, Vol 7, No 5, p 452-453, May 1973. 4 fig, 3 ref.

Descriptors: *Remote sensing, *Waste identification, *Pollutant identification, *Data collections, Water pollution, Oil spills, Pollutants, Water pollution sources, Spectrometers, Anions, Instrumentation, Automation, Nitrates.
Identifiers: *Laser-excited Raman spectroscopy, Raman spectra, Sensors.

A simple, inexpensive optical system has been constructed for obtaining Raman spectra of samples located remotely from the instrument. The capabilities of this system were demonstrated by obtaining spectra of dilute solutions of NO3 and of oil films on the surface of water with the sample located 21 ft from the instrument. Raman spectra were measured on a Spex Industries Model 1401 double monochromator using photon-counting detection and a CRL Model 52A argon-ion laser emitting at 4880 or 5145A. A schematic diagram is given of the optical system which utilizes a small diameter laser beam and a large diameter collimated scattered beam thus allowing both beams to traverse the same optical path between the instrument and the sample. Such an arrangement also allows an extension of the light path to almost any realistic distance. (Holoman-Battelle)
W73-12137

PHENOTYPIC CHARACTERIZATION OF BENECKEA PARAHAEMOLYTICA: A PRELIMINARY REPORT,
Hawaii Univ., Honolulu. Dept. of Microbiology.
P. Baumann, and L. Baumann.
Journal of Food and Milk Technology, Vol 36, No 4, p 214-219, April 1973. 17 fig, 3 tab, 19 ref.

Descriptors: *Pollutant identification, *Nutrient requirements, *Methodology, Marine bacteria, Enteric bacteria, Pathogenic bacteria, Isolation, Sea water, Surface waters.
Identifiers: *Characterization, *Cell morphology, *Bacterial physiology, *Beneckea spp, *Phenotype, Biochemical tests, Substrate utilization, Feces, Culture media, L-leucine, D-galactose, L-histidine, Sucrose, DL-beta-hydroxybutyrate, Voges-Proskauer test, L-arabinose, Glucuronate, Lipase, p-Hydroxybenzoate, Putrescine.

Eighty-six strains which were isolated from cases of gastroenteritis and had the general properties of the genus Beneckea were submitted to an extensive nutritional, physiological, and morphological characterization. The results indicated that this collection of strains, which included the type strain of Beneckea parahaemolytica, was phenotypically homogeneous and distinguishable from the other known species of Beneckea by multiple, unrelated, phenotypic traits. When grown in liquid medium, strains of B. parahaemolytica had single, sheathed, polar flagella; when grown on solid medium, these strains had unsheathed, peritrichous flagella in addition to the sheathed, polar flagellum. Additional traits of use for differentiation of these species from the remaining species of the genus Beneckea were the ability of B. parahaemolytica to grow at 40 C, utilize D-galactose, L-leucine, L-hiistidine, and putrescine and the inability to utilize sucrose, DL-beta-hydroxybutyrate or give a positive Voges-Proskauer reaction. The validity of some of the traits previously used to identify B. parahaemolytica as well as the possible difficulties encountered in the identification of this organism from marine sources are considered. (Holoman-Battelle)
W73-12138

CARBON SOURCE UTILIZATION TESTS AS AN AID TO THE CLASSIFICATION OF NON--FERMENTING GRAM-NEGATIVE BACTERIA,
Central Public Health Lab., London (England). National Collection of Type Cultures.
J. J. S. Snell, and S. P. Lapage.
Journal of General Microbiology, Vol 74, No 1, p 9-20, January 1973. 4 fig, 4 tab, 21 ref.

Descriptors: *Classification, *Pollutant identification, *Fermentation, Enzymes, Nutrient requirements, Computer programs, Systematics, Variability, Cultures, Viability, Nitrogen, Amino acids, Computers, Aerobic bacteria, Pathogenic bacteria, Soil bacteria, Aquatic bacteria, Enteric bacteria, Coliforms.
Identifiers: *Substrate utilization, *Gram-negative bacteria, *Biochemical tests, *Carbon source utilization tests, Culturing techniques, Bacterial physiology, Numerical taxonomy, Growth media, Reproducibility, Culture media, Acinetobacter spp, Alcaligenes odorans, Bordetella spp, Chromobacterium spp, Flavobacterium, Loefflerella mallei, Moraxella, Neisseria, Pseudomonas spp.

Difficulties in the use of carbon source utilization (CSU) tests for the classification and identification of bacteria prompted an investigation of some of the factors which affect the results. The classification derived by numerical taxonomy on the results of CSU tests was compared with that derived from results of conventional tests. One hundred eighty-seven strains of Gram-negative bacteria, chiefly nonfermentative, of the genera Acinetobacter, Alcaligenes, Loefflerella, Bordetella, Chromobacterium, Flavobacterium, Moraxella, Neisseria, and Pseudomonas were used in the investigation. Cultures were routinely incubated at 37 C except those of Pseudomonas fluorescens and Chromobacterium lividum which were incubated at 22 C. For a trial period, 94 strains were tested for their ability to utilize 10 different carbon sources on duplicate plates incubated at 30 and 37 C. Growth at these two temperatures was compared and results recorded as: growth developing at one temperature and not at the other; growth more luxuriant at either temperature; or no difference in growth at either temperature. There was little difference between the results at 37 and 30 C. Repetition of tests showed that 5 percent of the results were non-reproducible. The variability was more pronounced with acetate, maleate and sucrose amongst the substrates and Loefflerella mallei amongst the bacteria. Prior induction of the bacterial enzymes before testing did not reduce variability nor show any other advantage. Analysis of the results by numerical taxonomic methods revealed differences in the groups of bacteria derived from conventional biochemical test results. CSU tests readily provide a large number of taxonomic features with the advantage of a simple standardized testing procedure. (Holoman-Battelle)
W73-12140

A-D AND D-A CONVERTERS FOR HIGH SPEED DATA ACQUISITION APPLICATIONS,
Analogic Corp., Wakefield, Mass.
K. Jackson.
Computer Design, Vol 12, No 4, p 57-64, April 1973. 10 fig.

Descriptors: *Electronic equipment, *Data transmission, Data transmission, Data processing, Design.
Identifiers: *Analog to digital converters, *Digital to analog converters.

New circuitry for analog-to-digital (ADC) and digital-to-analog conversion (DAC) is shown schematically and described. ADC units may be singled-ended multiplexed or differential input multiplexed. High performance differential systems use a balancing cancellation technique known as common mode rejection to reduce the effects of unwanted induced voltages and currents. Submultiplexing may also be used in multiplexed ADC units to reduce settling time, crosstalk, and leakage current. Sample and hold amplifiers may be employed in some converters to increase the bandwidth capability and maintain accuracy of conversion. The development of new circuits and availability of lower cost components and production techniques have reduced the cost and increased the capabilities of ADC and DAC. (Little-Battelle)
W73-12141

CARBON PASTE ELECTRODE WITH A WIDE ANODIC POTENTIAL RANGE,
Uppsala Univ. (Sweden). Dept. of Analytical Chemistry.
J. Lindquist.
Analytical Chemistry, Vol 45, No 6, p 1006-1008, May 1973. 5 fig, 12 ref.

Descriptors: *Fabrication, *Aqueous solutions, *Electrochemistry, Cobalt, Anions, Cations, Anodes, Iodides, Construction, Heavy metals.

Identifiers: *Reproducibility, *Carbon paste electrode, Anodic potential, Cerium, Adenine, Precision, *Ion selective electrodes.

The construction is described of the carbon paste electrode which is being used widely for analytical work in the anodic region. The anodic limit is about plus 1.3 volt in acid aqueous media. In general, an improved carbon paste electrode can be obtained by removing oxygen from graphite powder in a vacuum at high temperature and then blocking the surface of the carbon against further adsorption of oxygen. Voltammograms were run in unstirred iodide, cerium (III), colbalt (II) and adenine solutions. Repeated measurements of the peak current of 0.0005 M Ce (III) in 0.1 M H2S04, where a new surface was prepared in the usual way before every run, gave a relative standard deviation of 1.16 percent. (Holoman-Battelle)
W73-12142

COMPARISON OF THE PRECISION OF NORMAL AND PRECISION SPECTROPHOTOMETRIC TECHNIQUES,
Oregon State Univ., Corvallis. Dept. of Chemistry.
J. D. Ingle, Jr.
Analytical Chemistry, Vol 45, No 6, p 861-868, May 1973. 4 fig, 2 tab, 23 ref.

Descriptors: *Spectrophotometry, *Methodology, Instrumentation, Equations, Chemical analysis, Measurement.
Identifiers: *Precision, Absorbance, Errors.

A general theory for the relative instrumental precision of normal and precision (transmittance ration, trace analysis, and ultimate precision) spectrophotometric absorbance measurements is presented. The theory presented takes into account both reading error and electrical noise (photocurrent shot noise, dark current shot noise, and source flicker noise). Equations are developed which indicate the gain in relative precision expected when a precision spectrophotometric technique is used to expand the transmittance scale in order to reduce the reading error. In some cases, the relative precision is reduced by scale expansion. The precision techniques are shown to be most advantageous for measurement of high absorbance solutions. (Holoman-Battelle)
W73-12143

VIBRIO PARAHAEMOLYTICUS-ISOLATION, IDENTIFICATION, CLASSIFICATION, AND ECOLOGY,
Georgetown Univ., Washington, D.C. Dept. of Biology.
R. R. Colwell, T. E. Lovelace, L. Wan, T. Kaneko, and T. Staley.
Journal of Milk and Food Technology, Vol 36, No 4, p 202-213, April 1973. 15 fig, 3 tab, 33 ref.

Descriptors: *Chesapeake Bay, *Pollutant identification, *Ecology, *Isolation, *Classification, *Methodology, Sediments, Oysters, Clams, Marine bacteria, Ecological distribution, Computer programs, Water analysis, Saline water, Crabs, Mollusks, Bottom sediments, Zooplankton, Systematics, Coasts, Bacteriophage, Gas chromatography, Water sampling, Estuarine environment, Electron microscopy, Cultures, Sewage, Radioactivity techniques, Aquatic soils, Phosphorus radioisotopes, Saline soils, E. coli, Plankton, Pathogenic bacteria.
Identifiers: *Vibrio parahaemolyticus, Numerical taxonomy, Chemotaxonomy, Serology, Blue Crab, Food poisons, Vibrio spp, Fatty acids, Isozyme, Phage typing, Culturing techniques, Organic bases, Polyacrilamide gel electrophoresis, Culture media, Gas liquid chromatography, Enrichment, Gram-negative bacteria, Cytophage, DNA, P-32, Callinectes sapidus.

Vibrio parahaemolyticus was isolated from samples of water, sediment, blue crabs, oysters, and clams collected in several areas of Chesapeake Bay. Numerical taxonomy was used to identify and classify the bacterial isolates. Deoxyribonucleic acid (DNA) base composition, serology, isozyme, gas chromatography, bacteriophage sensitivity, and DNA/DNA reassociation analyses confirmed the identification and classification of V. parahaemolyticus and permitted establishment of genetic relationships of the Chesapeake Bay strains with isolates from victims food poisoning in Japan and from samples taken in geographically diverse areas of the United States. Isolates implicated in recent outbreaks of food poisoning, the first fully documented cases of V. parahaemolyticus food poisoning in the United States, were shown by DNA/DNA reassociation measurements to be closely related to the Japanese and other isolates collected in the United States. Fatty acid profiles of cell derivatives prepared using GLC were useful in diagnosing Vibrio spp., including V. parahaemolyticus and Vibrio cholerae. Bacteriophages isolated from ocean sediments collected off Cape Hatteras were found to be active against V. cholerae and V. parahaemolyticus. Distribution of V. parahaemolyticus appears to be restricted to coastal and estuarine regions. V. parahaemolyticus has been shown to be closely associated with zooplankton and a life cycle for V. parahaemoluticus in Chesapeake Bay is proposed. (Holoman-Battelle)
W73-12144

AUTOMATIC METER READING USING EXISTING TELEPHONE CIRCUITS,
Utilities Telecommunications Council, Washington, D.C.

Journal of the American Water Works Association, Vol 65, No 2, p 99-111, February 1973. 4 fig, 1 tab.

Descriptors: *Telemetry, *Costs, *On-site data collections, *Data processing, Maintenance costs, Operating costs, Installation costs, Automatic control, Data transmission, Cost-benefit analysis, Variable costs, Operation and Maintenance, Estimated costs.
Identifiers: *Automatic meter reading, *Telephone circuits, Data communications terminal, Meter reading access circuit.

Information is provided on the cost factors involved in various possible configurations of telemetered meter reading. Specifically, this is concerned with (1) the reading of meters via telephone circuits, (2) the major cost factors involved in adopting such a system, both telephone company charges and utility costs, (3) some of the factors resulting in ranges of these cost, and (4) some of the other factors that should be considered in a decision concerning automatic meter reading. The system principles are explained for this type of telemetry. Two basic types of automatic meter reading systems are discussed: (1) the telephone company provides the data communications terminal (DCT), the meter reading access circuit (MRAC), and the line coupler or data set at the customer's premises; and (2) the utility instead of the telephone company, owns, installs, and maintains one or more of these elements. Other possible configurations are diagrammed and briefly discussed. (Holoman-Battelle)
W73-12145

ON THE PHOTODECOMPOSITION OF CHLOROPHYLL IN VITRO,
California Univ., Berkeley. Dept. of Nutritional Sciences.
For primary bibliographic entry see Field 05C.
W73-12146

A UNIFIED METHOD FOR THE RECONSTRUCTION OF SAMPLED DATA,
Florida Univ., Gainesville. Dept. of Electrical Engineering.
A. E. Durling, and T. E. Bullock.
IEEE Transactions on Computers, Vol C-22, No 4, p 388-396, April 1973. 5 fig, 2 tab, 10 ref.

Descriptors: *Methodology, *Systems analysis, Data processing, Model studies, Mathematical models, Mathematical studies.
Identifiers: *Sample data, *Data reconstruction, *Digital to analog converters, Polynomial interpolation, Digital filtering.

Many digital systems have need for continuous-type output for oscilloscope display, process control, or hybrid computation. A generalization and unification are presented of the theory of extrapolation and reconstruction of sampled data. This generalization allows implementation of a recursive algorithm or digital filter in conjunction with the continuous data reconstruction. The general procedure is demonstrated for the implementation of an nth-order recursion relation using polynomial or exponential data reconstruction requiring only a single resetting integrator for the general nth-order reconstructor. (Holoman-Battelle)
W73-12147

BEHAVIOR OF THE SILVER, SILVER CHLORIDE ELECTRODE IN CONCENTRATED AQUEOUS SODIUM CHLORIDE,
Southern Illinois Univ., Carbondale. Dept. of Chemistry and Biochemistry.
H. F. Gibbard, Jr.
Journal of the Electrochemical Society, Vol 120, No 5, p 624-627, May 1973. 2 fig, 3 tab, 31 ref.

Descriptors: *Thermodynamic behavior, *Physicochemical properties, *Sodium chloride, *Aqueous solutions, Solubility, Electrochemistry, Solvents, Electrolytes, X-ray diffraction.
Identifiers: *Solute concentration, Silver electrodes, Ion selective electrodes, *Silver chloride, Solutes.

Electrochemical experiments are reported which confirm the imperfection of the silver/silver chloride electrode in concentrated aqueous sodium chloride. Further experiments and calculations (electrochemical cell measurements and x-ray diffraction) are used to explain this behavior in terms of the formation of a solid solution of silver chloride and sodium chloride. The mole fractions and activities of silver chloride in the solid solutions are calculated from solubility equilibria and are correlated with literature values of the activity coefficients of sodium chloride. (Holoman-Battelle)
W73-12148

THE TAXONOMIC POSITION OF OBESUMBACTERIUM PROTEUS, A COMMON BREWERY CONTAMINANT,
Birmingham Univ. (England). Dept. of Biochemistry.
F. G. Priest, H. J. Somerville, J. A. Cole, and J. S. Hough.
Journal of General Microbiology, Vol 75, No 2, p 295-307, April 1973. 5 fig, 7 tab, 23 ref.

Descriptors: *Systematics, *Cultures, Enteric bacteria, Pollutant identification, Growth rates.
Identifiers: *Obesumbacterium proteus, *Characterization, Dendrograms, Culture media, Hafnia alvei, DNA, Salmonella gallinarum, Biochemistry.

The mole fraction of guanine plus cytosine in the DNA from Obesumbacterium proteus was 48 percent similar to that of Hafnia alevi, Salmonella gallinarum and the RM bacterium. DNA:DNA competition studies indicated that O. proteus strains fall into two groups, both of which could reasona-

ble be included in the family Enterobacteriaceae. The same two groups were apparent from a numerical taxonomic investigation of 19 0. proteus strains which included 16 brewery isolates. The simple matching coefficients (percent S) were calculated from results of 50 biochemical and taxonomic tests, and a dendrogram was constructed. Every O. proteus isolate had the characteristics of the family Enterobacteriaceae. The two subgroups united at 86 percent S, and formed a cluster with Hafnia and Salmonella strains at 72.5 percent S. The difference between Hafnia alvei and O. proteus was almost entirely due to their different vigour rating. Furthermore, in a simulated brewery fermentation, two strains of H. alvei grew in a mixed culture with yeast. This was originally the defining characteristic of the genus Obesumbacterium. Reference to the genus Obesumbacterium should be discontinued, and O. proteus should be placed in the genus Hafnia as Hafnia protea comb. nov. (Little-Battelle)
W73-12149

POTENTIAL PATHOGENS IN THE ENVIRONMENT: ISOLATION, ENUMERATION, AND IDENTIFICATION OF SEVEN GENERA OF INTESTINAL BACTERIA ASSOCIATED WITH SMALL GREEN PET TURTLES,
Oregon State Univ., Corvallis. Dept. of Microbiology.
R. H. McCoy, and R. J. Seidler.
Applied Microbiology, Vol 25, No 4, p 534-538, April 1973. 3 tab, 26 ref.

Descriptors: *Cultures, *Salmonella, Water analysis, Pathogenic bacteria, Separation techniques, Enteric bacteria, Pulbic health, Water pollution sources, Coliforms, Isolation.
Identifiers: *Aeromonas, *Citrobacter, *Enterobacter, *Klebsiella, *Proteus, *Serratia, Feces, Culture media.

Bacteriological analyses were performed on fecal swabs and the aquarium water of 27 individually purchased specimens of the small green pet turtle, Pseudemys scripta elegans. Samples for bacteriological examination, except Klebsiellae, were immediately prepared from the swabs or from dilutions of the saline in which the turtle had been immersed. A second saline sample was removed for examination after 5 days. Klebsiellae were isolated and enumerated after turtles were maintained for several months. Salmonellae were enriched in tetrathionate broth, streaked onto Brilliant Green sulfa agar, picked, and subject to biochemical and serological examination. Enterobacter and Klebsiella were isolated from saline samples by plating onto a modified nitrogen-deficient medium of Hine and Wilson. Aeromonads were isolated and enumerated on peptone-beef extract-glycogen agar. Biochemical examination of all enteric isolates was accomplished by the methods of the Manual of Clinical Microbiology. Representatives of Aeromonas, Citrobacter, Enterobacter, Klebsiella, Proteus, Salmonella, and Serratia were isolated. Enterobacter, Klebsiella, Proteus, Salmonella, and Serratia were isolated. Enterobacter, Klebsiella, and Salmonella were encountered in 20 percent or more of the specimens, whereas Aeromonas was isolated from 63 percent. Klebsiella pneumoniae counts ranged from 1000 to 10,000 per milliliter of aquarium water, whereas Aeromonas routinely exceeded 10,000 per milliliter. Aeromonas cultures from turtles were identical to 7 human isolates in some 29 biochemical tests. (Little-Battelle)
W73-12150

DISTRIBUTION OF THE CLADOCERAN PODON POLYPHEMOIDES IN THE CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
H. F. Bosch, and W. R. Taylor.
Marine Biology, Vol 19, No 2, p 161-171, March 1973. 10 fig, 47 ref.

Descriptors: *Distribution patterns, *Crustaceans, *Life cycles, *Water temperature, *Salinity, *Seasonal reproduction, *Dissolved oxygen, Sampling, Invertebrates, Marine animals, Animal populations, Life history studies, Biorhythms, Sea water, Zooplankton, Standing crops, Estuarine environment, Waterfleas, Chesapeake Bay.
Identifiers: *Podon polyphemoides, Macroinvertebrates, Vertical distribution.

The distribution of the cladoceran Podon polyphemoides (Leuckart) in the Chesapeake Bay estuarine system was determined by a quantitative pump sampling method, and the patterns of abundance were correlated with temperature and salinity distributions. The species was seasonally recurrent, with distinct population maxima in the central portion of the bay. Population densities in excess of 60,000 podonids/cu m have been recorded. The podonids first appeared in the spring in the shallow tributaries, when water temperatures near the bottom reached 6C. The vernal populations disappeared when summer temperatures exceeded 27C, but reappeared in the fall as the water cooled. The species was euryhaline and eurythermal in its distribution, but the greatest concentrations were attained within relatively narrow zones of temperatures between 11 and 26C, and salinities between 0.8 and 1.8 percent. The production of males, sexual females and sexual eggs occurred both in the spring and the fall between the thermal limits of 11 and 17C. (Little-Battelle)
W73-12152

THE USE OF RADIOACTIVE ISOTOPES TO MEASURE THE TRANSFER OF MATERIALS IN AQUATIC FOOD CHAINS,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
R. J. Conover, and V. Francis.
Marine Biology, Vol 18, No 4, p 272-283, February 1973. 5 fig, 4 tab, 29 ref.

Descriptors: *Radioactivity techniques, *Mathematical models, *Food chains, *Kinetics, *Aquatic life, *Transfer, Absorption, Nutrients, Cycling nutrients, Radioisotopes, Feeding rates, Grazing, Respiration, Model studies, Phosphorus, Zooplankton, Phytoplankton, Reviews, Digestion, Mollusks, Equations.
Identifiers: Accuracy, Errors, Elimination, Computer simulation.

Radioisotopes have been misused extensively by ecologists in transfer studies within food chains. Unless it is known that no recycling of isotope has occurred during the experiment, the assumption of linear uptake when in fact the system is not linear, even over short periods, can lead to significant errors in the estimation of ingestion or feeding. If recycling occurs, at least a 3 or 4-compartment hydraulic-type model is necessary to even approximate the complicated kinetics of isotopic transfer in a simple aquatic feeding experiment. It is essential to follow the uptake or loss of an isotope (change in specific activity) as a function of time in at least 1 compartment before deciding on an appropriate model. If experiments are designed so that the maximum number of rate processes are summed or integrated by the animal, the kinetics can be considerably simplified. If the food supply is uniformly labelled, the rate of change of tracer can be used to give a rate of ingestion (grazing). If the predator is labelled with a suitable isotope before starting the experiment, the rate of loss of its isotope burden under different experimental conditions can be used to determine respiration or excretion rates, turnover rates, ingestion, and the size and number of major compartments in the transfer system. (Little-Battelle)
W73-12153

ROLE OF MARINE FUNGI IN THE BIOCHEMISTRY OF THE OCEANS. V. PATTERNS OF CONSTITUTIVE NUTRITIONAL GROWTH RESPONSES,
Florida Atlantic Univ., Boca Raton. Dept. of Biological Sciences.
P. L. Sguros, J. Rodrigues, and J. Simms.
Mycologia, Vol 65, No 1, p 161-174, January-February 1973. 1 fig, 4 tab, 20 ref.

Descriptors: *Marine fungi, *Nitrogen, Growth rates, Carbon, Hydrogen ion concentration, Cultures, Nutrients.
Identifiers: *Halosphaeria mediosetigera, *Culcitalna achraspora, *Humicola alopallonella, *Culture media, Ammonium chloride, Potassium nitrate, Potassium nitrite, Ammonium nitrate, Arabinose, Xylose, Ribose, Fructose, Glucose, Mannose, Galactose, Cellobiose, Melibiose, Lactose, Maltose, Sucrose, Raffinose, Rhamnose, Ribitol, Mannitol, Galactitol, Glucuronate, Galacturonate, Gluconate, Glucosamine, N-Acetylglucosamine, Formates, Acetates, Propionates, Butyrates, Caproates, Tartrates, Lactates, Glycerol, 2-Oxoglutarate, Citrates, Succinates, Fumarates, Malates, Glyoxylates, Glycolates, Benzoates, p-Hydroxybenzoate, Dimethoxybenzoate.

Halosphaeria mediosetigera, Culcitalna achraspora, and Humicola alopallonella, cellulolytic marine isolates, were grown in shake flasks in a variety of liquid artificial seawater media designed to demonstrate the value of 38 inorganic and organic compounds as nitrogen (N) sources and 79 organic compounds as carbon (C) sources. Inoculum production and experimental growth was standardized and gravimetrically quantitated. The effects of tris (Hydroxymethyl)aminomethane (THAM) buffer or growth and pH changes in the presence of quantitative variations of the best nitrogen sources were assessed. High C/N source ratios, ranging from 18 to 55, were preferred. While pH remained stable in the presence of THAM, omission of the buffer confirmed the acidogenic nature of NH4 plus salts, pH values of 3.0 or less being recorded. Patterns of C source utilization were compared, emphasizing the effect of sugar derivatives, with those of terrestrial cellulolytic species. In spite of generic differences, marine test organisms responded with remarkable similarity. Generally, all inorganic N sources, urea, valine, leucine, alanine, arginine, glutamate, glutamine, aspartate, asparagine, hypoxanthine, and xanthine promoted significant growth for all three species with glucose as the C source. Cultures proved far more selective in their use of C sources, good growth occurring consistently only in the presence of glucose, fructose, mannose, cellobiose, and xylose. Those organic substrates which acted as good N sources were unable to furnish required C even in the presence of sparking quantities of glucose. Carbohydrate, substituted carbohydrate, and glycoside utilization patterns compared favorably with those of terrestrial species. In the absence of explicit permeability data, it is suggested that these cultures are narrowly saccharolytic, but may be only insignificantly proteolytic, lipolytic, nucleolytic, or ligninolytic. Broader studies are required before adaptive recalcitrance can be used to describe marine fungi in general. (Little-Battelle)
W73-12154

REPORT OF ANALYSES OF WATER SAMPLES SUBMITTED TO SCRIPPS NOVEMBER 1971 FOR THE LAKE MICHIGAN INTERCALIBRATION/INTERCOMPARISON PROGRAM (EHP),
Scripps Institution of Oceanography, La Jolla, Calif. Soledad Lab.
T. R. Folsom, V. F. Hodge, K. M. Wong, and N. Hansen.
Available from the National Technical Information Service as TID-26199. AT (04-3)-34, N00014-69-A-0200-6011. Report No. TID-26199, April 6, 1972. 6 p, 4 ref.

Descriptors: *Water analysis, *Methodology, Laboratories, Lake Michigan, Water sampling.

Identifiers: *Performance evaluation, *Intercalibration programs, Method evaluation, Cesium radioisotopes, Plutonium radioisotopes, Chemical recovery, Interlaboratory tests, Pu-239, Pu-236, Pu-240, Cs-134, Cs-137.

Water samples were collected at 45 m in Lake Michigan and from the surface near a Chicago water intake station. The latter sample was spiked with radionuclides, including Cs. The pH of both samples was adjusted to 1.0 with dilute NaOH and Cs-133 and Pu-236 spikes were added. The samples were agitated for 15 min, 10 g of pure AMP added to each, and the agitation continued for 15 min more. The AMP precipitates were combined for gamma assay after which they were analyzed for stable Cs, Pu recovery, and Cs-134 and Cs-137. The sample of Lake Michigan water contained 0.058 plus or minus 0.014 pCi (plus or minus 1 gamma)/kg Cs-137, 0.005 pCi/kg Cs-134, and 0.0007 plus or minus 0.003 pCi/kg Pu-239 and Pu-240. In the spiked sample was found 3.66 plus or minus 0.10 pCi/kg Cs-137, 2.76 plus or minus 0.08 pCi/kg Cs-134, and 0.0373 plus or minus Pu-239 and Pu-240. It was concluded that although considerable care was used in these analyses, they should not be used for final evaluation of the relative capabilities of the several laboratories or of the general conditions in Lake Michigan because (a) not enough samples were supplied, (b) the low level reference standards have not been intercompared in all laboratories, and (c) absolute checks of radioactivity of several of these isotopes are still controversial at these very low concentration levels. (Holoman-Battelle)
W73-12156

A NEW SPECIES OF BAETIS (EPHEMEROPTERA) FROM PONDS IN THE CANADIAN ARCTIC, WITH BIOLOGICAL NOTES,
Saskatchewan Univ., Saskatoon. Dept. of Biology.
D. M. Lehmkuhl.
Canadian Entomologist, Vol 105, No 2, p 343-346, February 1973. 8 fig, 1 tab, 9 ref.

Descriptors: *Systematics, *Mayflies, Aquatic insects, Invertebrates, Speciation, Classification, Canada.
Identifiers: *Baetis bundyi, Macroinvertebrates.

Baetis bundyi new species is described from nymphs which were collected from tundra ponds in the central Canadian arctic (62.45 N., 94.27 W). Based on measurements of a series of nymphs, the eggs must hatch in early July and adults emerge in August. A table is presented for separating this species from other known arctic Baetis. (Little-Battelle)
W73-12157

INITIAL STUDIES ON A METHOD OF ALGAL ASSAY FOR NUTRIENT PARAMETERS IN WATER,
Saskatchewan Univ., Regina. Dept. of Biology.
D. R. Cullimore, and A. McCann.
J Fish Res Board Can. Vol 29, No 2, p 195-198, 1972. Illus.
Identifiers: *Algal assay, *Bioassay, Carbon, Filtration, Nitrogen, *Nutrients, Phosphorus, Readings, Reflectometric readings.

A bioassay technique was outlined for estimating the impact of supplementation of the nutrients C, N, and P on algal growth. One of the main problems was the monitoring of algal growth using lengthy techniques of chlorophyll extraction with acetone. An alternative system involving filtration and reflectometric readings at 600 nm is described and found to be satisfactory when 5 readings were taken per filtered disk. -Copyright 1972, Biological Abstracts, Inc.
W73-12158

ENVIRONMENTAL STATEMENT, RIO BLANCO GAS STIMULATION PROJECT, RIO BLANCO COUNTY, COLORADO.
Atomic Energy Commission, Washington, D.C.

Available from NTIS, Springfield, Va., as WASH-1519 (D). Report No. WASH-1519, April 1972. 170p, 38 fig, 22 tab, 65 ref, 6 append.

Descriptors: *Nuclear explosions, *Underground, *Natural gas, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Beneficial use, Cost-benefit analysis, Natural resources.
Identifiers: Atomic Energy Commission, *Gas Buggy, *Plowshare Program. Environmental Impact Statements.

This environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed Rio Blanco Gas Stimulation Project in Rio Blanco County, Colorado. Environmental impacts are assessed, consideration given to alternatives, and an environmental benefit-cost summary compiled. Some environmental factors considered include hydrology (surface water and ground water), ecology, radioactivity release, seismology (including ground motion), geology, mineral resources, chemical effects, waste management, and results of the flaring operation. The conclusion is that the proposed project is the best available alternative, that the benefits of the proposed action outweigh its probable environmental costs, and that the project should be implemented. (Houser-ORNL)
W73-12258

ACTIVATION ANALYSIS OF MERCURY IN BIOLOGICAL SAMPLES,
Technische Hochschule, Munich (West Germany). Institut fuer Radiochemie.
J. I. Kim, and S. R. Sunoko.
Available from NTIS, Springfield, Va., as CONF-721010-39; $4.00 in paper copy; $1.45 microfiche. Report CONF-721010-39. (1972), 12p, 1 fig, 8 tab, 16 ref.

Descriptors: *Mercury, *Bioindicators, *Neutron activation analysis, *Analytical techniques, Radioactivity techniques, Separation techniques, Public health, Food chains, Path of pollutants.

Mercury was separated before evaluation of its gamma spectrum to avoid interference from Na, K, P, and halogens. The Hg was dissolved by refluxing the samples in concentrated nitric acid and was separated by deposition from 0.5 to 1.5 molar acid on copper sieving or granules. Techniques are detailed for handling urine, tuna fish, and kale samples. The sensitivity was about 0.2 ppb for urine; about 0.01 ppm for tuna fish and kale. (Bopp-ORNL)
W73-12260

INVESTIGATIONS OF THE FATE OF CERTAIN PESTICIDES UNDER BIOTIC AND ABIOTIC CONDITIONS USING TRACER TECHNIQUES,
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Neuherberg bei Munich (West Germany).
For primary bibliographic entry see Field 05B.
W73-12261

A SIMPLE METHOD FOR THE ACTIVATION ANALYSIS OF MERCURY IN FISH: MERCURY CONTENT IN VENEZUELAN CANNED TUNA,
Instituto Venezolano de Investigaciones Cientificas, Caracas.
J. A. Lubkowitz, F. Montoloy, and M. Heurtebise.
In: Radiotracer Studies of Chemical Residues in Food and Agriculture, International Atomic Energy Agency, Vienna, p 77-80, 1972, Vienna, 1 fig, 1 tab, 11 ref.

Descriptors: *Mercury, *Food chains, *Marine fish, *Neutron activation analysis, Radioactivity techniques, Analytical techniques, Radiochemical analysis, Separation techniques, Public health.

Mercury in canned tuna (0.071-1.33 ppm) and sardines (0.009 ppm) was determined by measurement of Hg197 (73 kev) gamma radiation with a 'thin' NaI (tl) crystal coupled to a pulse-height analyser. Samples irradiated in quartz ampoules were allowed to decay for 2-3 days, frozen in liquid nitrogen and wrapped with a thin polyethylene sheet, broken, and transferred to a flask containing Hg carrier. After digestion in an acid mixture at 90-95 C, the mixture was neutralized and the Hg absorbed from solution on iodinated ion exchange resin for counting. About 40 samples/day were processed. (Bopp-ORNL)
W73-12267

BAYESIAN ESTIMATION AND DESIGN OF EXPERIMENTS FOR GROWTH RATES, WITH APPLICATIONS TO MEASURING WATER QUALITY,
American Cyanamid Co., Norwalk, Conn.
D. W. Behnken, and D. G. Watts.
In: Proceedings (Vol. 1), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972, p 2-15, (1972) 2 fig, 3 tab, 4 ref.

Descriptors: *Water quality, *Monitoring, Lakes, *Growth rates, *Algae, *Design, Measurement, Distribution, Optimization, Equations, Mathematical models, Systems analysis.
Identifiers: *Bayesian estimation.

One procedure for monitoring the quality of a lake is to inject a sample of lake water with an algal culture and measure the growth rate of the algae. An oligotrophic lake should induce a low rate of growth, a eutrophic lake a high one. It is assumed that over the experimental period the algal growth rate follows an exponential law, that is the density of algae is small so that important nutrients are not depleted. It is further assumed that the algal counts are well described by a Poisson distribution. A Bayesian approach is presented to derive an expression for the best estimate of the growth rate parameter and a distribution which describes the relative plausibility of different values. Considered also is the related design problem, that is the problem of choosing the sampling times and the volumes at each time in order to provide an estimate of the growth rate with the greatest precision or sharpest posterior distribution. The results are illustrated with reference to a particular example using a culture of algal, Selenestrum capricornutum (PAAP strain). (See also W73-12269) (Bell-Cornell)
W73-12270

DESIGN OF USAF WATER QUALITY MONITORING PROGRAMS,
Air Force Adademy, Colo. Dept. of Civil Engineering.
S. E. Schultz.
Available from NTIS, Springfield, Va 22151 as AD-756 504 Price $3.00 printed copy; $1.45 microfiche. Air Force Systems Command, Frank J. Seiler Research Laboratory Report SRL-TR-72-0018, August 1972. 189 p, 12 fig, 32 tab, 31 ref, 8 append.

Descriptors: *Water quality, *Networks, *Data collections, *Water pollution control, Military reservations, Water analysis, Sampling, Chemical analysis, Surface waters, Groundwater, Data processing, Data storage and retrieval, Computer programs.

A study was made to evaluate and assist in the future implementation of water quality monitoring programs at Air Force installations. Such a network of Air Force monitoring stations is necessary

for (1) the assessment of compliance with federal, state and local water quality standards, (2) the evaluation of the effectiveness of water pollution abatement measures, and (3) the detection of potential water quality problems requiring corrective action before a crisis develops. In addition to accomplishing these minimum Air Force responsibilities an Air Force wide water quality monitoring program would provide for justification for Air Force water pollution abatement facilities; detection of long-term trends and overall changes in water quality; the most appropriate areas for research studies; and support of nationwide water quality surveillance network and local area pollution abatement programs. (Woodard-USGS)
W73-12317

5B. Sources of Pollution

DISTRIBUTION OF MERCURY, CADMIUM, LEAD AND THALLIUM IN A EUTROPHIC LAKE,
Bradley Univ., Peoria, Ill. Dept. of Biology.
B. J. Mathis, and N. R. Kevern.
Available from the National Technical Information Service as PB-221 993, $3.00 in paper copy, $1.45 in microfiche. Institute of Water Research, Michigan State University, East Lansing, Project Completion Report, June 1973. 25 p, 6 fig, 5 tab, 21 ref. OWRR A-062-MICH (1). 14-31-0001-3522.

Descriptors: *Mercury, *Cadmium, *Lead, *Water pollution, *Heavy metals, *Biota, Aquatic environment, Limnology, Food chain, Lenthic Environment, Lakes.
Identifiers: *Thallium, Atomic absorption spectrophotometry.

The concentrations were studied of mercury, cadmium, lead and thallium in various components of a eutrophic lake. Five species of fishes, two species of aquatic macrophytes, zooplankton, migratory goose feces, water and sediments were analyzed for the four metals. The study revealed that the bottom sediments act as a 'sink' for all four metals. With the exception of mercury, highest concentrations were found in bottom sediments. Mercury was detected in fishes and sediments only, while thallium was detected only in bottom sediments. Largemouth bass, one of the top carnivores of the lake, exhibited a positive correlation between length and weight versus mercury concentrations in axial musculature. The feces of migratory waterfowl had high conentrations of cadmium and lead. In view of the large numbers of waterfowl using the lake each year, and the large quantity of feces deposited within the drainage basin, it is suggested that this avenue may be one of the major sources of contamination for these two metals and that fallout from airborne particulate matter is secondary. Residual concentrations of the four metals in soil of the drainage basin were not determined. The primary source of mercury and thallium for the lake is presumed to be from fallout of airborne particulate matter.
W73-11707

KINETICS OF MICROBIALLY MEDIATED METHYLATION OF MERCURY IN AEROBIC AND ANAEROBIC AQUATIC ENVIRONMENTS,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
J. J. Bisogni, Jr., and A. W. Lawrence.
Available from the National Technical Information Service as PB-222 025, $6.00 in paper copy, $1.45 in microfiche. Technical Report 63, May 1973. 180 p, 23 fig, 31 tab, 123 ref. OWRR-A-038-NY (1). 14-31-0001-3532-3832.

Descriptors: *Mercury, *Microorganisms, *Kinetics, *Aquatic environment, Water pollution sources, Analytical techniques, Temperature, Heavy metals.
Identifiers: Methylation.

The microbial transformation of inorganic mercury to organic mercury (mono-methyl- and dimethyl-mercury) was studied with regard to the effects of the following: (1) redox potential, (2) inorganic mercury concentration, (3) temperature, (4) microbial activity, and (5) sulfide concentration. A kinetic model to describe the rate of methylation included the following parameters: (1) coefficient indicating relative microbial activity, (2) a coefficient indicating biochemical availability of the inorganic mercury, (3) a parameter determined by the system redox potential, and (4) inorganic mercury concentration. The kinetic studies showed that: (1) monomethylmercury is the predominant product of methylation of mercury (near neutral pH), (2) the rate of methylation was higher in aerobic systems than in anaerobic systems for a given inorganic mercury concentration and microbial growth rate, (3) higher microbial growth rates result in higher methylation at a given inorganic mercury conentration for both aerobic and anaerobic systems, (4) methylation rates could be hindered by the addition of sulfide to some anaerobic systems, (5) temperature affects methylation rates only as it affects the microbial activity of the methylating organisms, and (6) large amounts of metallic mercury were stripped from the aqueous phase in all reactors. The kinetic model was extended for application to natural aquatic benthic regions, and biological waste water treatment schemes, and was used to evaluate proposed decontamination schemes for mercury polluted aquatic environments.
W73-11711

CATION TRANSPORT IN SOILS AND FACTORS AFFECTING SOIL CARBONATE SOLUBILITY,
Utah State Univ., Logan.
J. J. Jurinak, S. H. Lai, and J. J. Hassett.
Copy available from GPO Sup Doc as EP1.23/2:1, 73-235, $1.25, microfiche from NTIS as PB-222 006, $1.45. Environmental Protection Technology Series Report No EPA-R2-73-235, May 1973. 87 p 23 fig, 4 tab, 31 ref, append. EPA Project 13030 FDJ.

Descriptors: *Ion transport, *Calcium carbonate, Leaching, Cation exchange, Irrigation, Return flow, Chemical precipitation, Hardness (Water), Solutes, Solubility.
Identifiers: *Solute transport, *Carbonate solubility, Miscible displacement, Carbonate saturometer.

A predictive model of cation transport in soils undergoing miscible displacement was developed and tested. A mass balance equation was formulated to include a general nonlinear cation exchange function. The model was applied to the transport of cations through an exchanger using five types of exchange functions. The model was further tested by conducting soil column studies which involved both homovalent and heterovalent exchange. Good agreement between experimental and predicted data was obtained. Laboratory studies were also conducted to assess the affect of Mg+2 ion on the solubility of calcareous materials. Solubility was found to vary with the surface area and mineralogy of the carbonate material, and the degree of saturation of the water with respect to a given carbonate mineral. In waters unsaturated with respect to calcite, Mg+2 generally increased the solubility of calcite. The presence of Mg+2 decreased the solubility of dolomite in waters which were near saturation with respect to dolomite. (EPA)
W73-11714

FEEDLOT WASTE UTILIZED EFFICIENTLY BY ANIMALS.
Oklahoma State Univ., Stillwater.

Agriculture at OSU, Summer, 1972, 1 p.

Descriptors: *Farm wastes, Sheep, *Feed lots, *Proteins.
Identifiers: *Digestibility.

Feedlot dry wastes from an open feedlot were fed to sheep. Though the wastes were high in digestible protein and nutrients, a potential hazard is the entry of toxic materials into the human food chain. These first tests were limited and need to be repeated more thoroughly before any recommendations will be available. (Lee-East Central)
W73-11762

DAIRY WASTE PONDS EFFECTIVELY SELF--SEALING,
Agricultural Research Service, Riverside Calif. Soil and Water Conservation Research Div.
S. Davis, W. Fairbank, and H. Weisheit.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper no 72-222, 10 p, 2 tab, 1 fig, 10 ref.

Descriptors: Groundwater pollution, Farm wastes, *Infiltration rates, *Farm lagoons, Sewage ponds, *Sealing, Cattle, Dairy Industry.

Infiltration rates of contaminated water from manure ponds are discussed. Infiltration rates of a dairy waste pond were measured with irrigation water before manure water was applied. Infiltration decreased from 48 inches per day with clean water to 0.2 inches per day with manure water after 4 months. (Lee-East Central)
W73-11764

WHY NITRATES IN WATER SUPPLIES,
G. E. Smith.
Hoard's Dairyman, Vol 110, No 18, p 1048-1049, September 25, 1965. 3 fig.

Descriptors: *Nitrates, Feed lots, Fertilizers, *Farm wastes, Missouri, Water supply, Water wells, Water pollution sources.
Identifiers: *Water contamination.

Studies show that 75% of Missouri's water is contaminated by nitrates, primarily from feedlots. Shallow wells are most affected, but deep ones can be if improperly cased. To solve the problem, new properly encased wells should be dug some distance from feedlots. (Marquard-East Central)
W73-11765

WINTER AND SUMMER SHELTER FOR BEEF CATTLE IN LOUISIANA,
Louisiana State Univ., Alexandria. Dean Lee Agricultural Center.
J. Pontif, W. A. Nipper, A. F. Loyacano, and H. J. Braud.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No 72-425, 23 p, 6 fig, 7 tab, 6 ref.

Descriptors: *Feed lots, *Farm wastes, *Louisiana, Windbreaks, *Climates, Cattle, Feedlots.
Identifiers: Shelters, Fans.

The purpose was to learn what advantage in feedlot performance of fattening cattle could be attributed to winter shelter and summer shade and fans under Louisiana feedlot conditions. Experimental procedures are detailed. Findings are reported in figures and tables. It was found that (1) winter roofs did not improve gain, (2) windbreaks were detrimental to daily gains because they prevented drying of wet floors, (3) fans did not increase gains, and (4) summer shades were most beneficial in promoting gains. (Marquard-East Central)
W73-11768

HOW WEATHER AFFECTS FEEDLOT PERFORMANCE.

Feedlot Management, Vol 13, No 2, p 38-39. February, 1971.

Descriptors: *Mud, *Rain, *Winds, *Feedlots, Farm wastes, *Weather effects, Winter, Productivity.
Identifiers: Shelter.

Studies were made of weather factors associated with winter as possible causes of reduced feedlot performance. Tests were performed under artificially produced conditions. Mud was the most serious cause of reduced production. Rate of gain was reduced and the amount of feed required increased. Artificial areas are described and resulting data are given. (Fomby-East Central)
W73-11772

MATHEMATICAL SIMULATION OF ENERGY METABOLISM IN BEEF ANIMALS,
Oklahoma State Univ., Stillwater.
M. D. Paine, J. A. Witz, A. F. Butchbaker, C. M. Bacon, and J. E. McCroskey.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No. 72-510, 25 p, 8 fig, 2 tab, 26 ref.

Descriptors: *Feed lots, *Mathematical models, *Energy, Systems analysis, Farm wastes, Cattle, *Animal metabolism.
Identifiers: Bioenergetics.

A mathematical model is presented that determines the amount of energy gained and lost in a feedlot situation by using a systems approach. Validation of the complete model indicated that more experience with model parameters will be necessary. However, the model did show potential for making valid estimates of animal growth and feed consumption. Possible applications of the model are demonstrated and discussed. Figures and tables list feedlot variables considered and predictions vs. experimental data in determining the validity of this mathematical model. (Marquard-East Central)
W73-11779

NITRATES DANGER FOR HUMANS, TOO,
J. E. Grundman.
Missouri Ruralist, p 24-25, February 27, 1965.

Descriptors: Feed lots, *Water wells, *Nitrates, *Farm wastes, *Missouri, Water pollution sources.
Identifiers: Nitrate cyanosis.

Nitrate contamination of well water in Missouri has been recognized in recent years. Although sampling is incomplete and data not totally conclusive, nitrate pollution appears to be closely linked with proximity to feed lots and livestock wastes, silo drainage, manure piles, and septic tanks. Infants not yet consuming solid foods are subject to nitrate cyanosis from the intake of high-nitrate water in feedlot areas. A high nitrate content also accounts for a number of maladies in livestock. Suggestions for combating nitrate pollution are given. (Anderson-East Central)
W73-11781

A SURVEY OF DISPERSION COEFFICIENTS FOR ESTIMATING POLLUTANT TRANSPORT,
Grumman Aerospace Corp., Bethpage, N. Y.
K. Keen.
Available from NTIS Springfield, Va 22151 as AD-754 010, Price $3.00 printed copy; $1.45 microfiche. Research Department Memorandum RM-562, December 1972. 35 p, 17 ref.

Descriptors: *Water pollution sources, *Path of pollutants, *Waste assimilative capacity, Mathematical studies, Dispersion, Turbulence, Waste treatment, Design criteria, Rivers, Estuaries, Analytical techniques, Evaluation, Reviews.

Pollutants discharged into any body of water are distributed primarily by advection and turbulent diffusion. To estimate the magnitude of this latter mechanism, a determination of a term known as the turbulent dispersion coefficient is necessary. A survey is presented of some of the more recent (through mid-1971) attempts made to define this coefficient for coastal regions, rivers, and estuaries. The effluent from a plant may discharge into a river, bay, or coastal region, in each of which a different mixing process is taking place. Thus, the importance of knowing the dispersion coefficient of the receiving waters can immediately be interpreted in terms of the dollars associated with the complexity of the treatment facility. (Woodard-USGS)
W73-11814

FIELD STUDIES ON SALT LEACHING IN A HIGHLY SALINE SODIC SOIL,
Central Soil Salinity Research Inst., Karnal (India).
For primary bibliographic entry see Field 02G.
W73-11835

OIL AND ICE IN THE ARCTIC OCEAN: POSSIBLE LARGE-SCALE INTERACTIONS,
Geological Survey, Tacoma, Wash. Ice Dynamics Project.
W. J. Campbell, and S. Martin.
Science, Vol 181, No 4094, p 56-58, July 6, 1973. 1 fig, 1 tab, 18 ref.

Descriptors: *Oil spills, *Sea ice, *Arctic, *Albedo, *Climatology, Water pollution effects, Disasters.

The diffusion and transport mechanisms generated by the pack ice dynamics of the Beaufort Sea, combined with the slow rate of biodegradation of oil under Arctic conditions, would diffuse an oil spill over the sea and eventually deposit the oil on the ice surface, where it would lower the natural albedo over a large area. The Arctic pack ice covers an area of about 10 million sq km with an average thickness between 3 and 4 m. This thin veneer of ice is extremely important in determining the heat exchange between the ocean and atmosphere. If the ice cover were removed from the Arctic, it might not reform. Modification of the snow or ice surface is the most effective means of large-scale ice removal. (Knapp-USGS)
W73-11839

ENVIRONMENTAL RESEARCH LABORATORIES IN THE FEDERAL GOVERNMENT--AN INVENTORY, VOLUMES I AND II,
Syracuse Univ. Research Corp., N. Y. Policy Inst.
For primary bibliographic entry see Field 09C.
W73-11845

SILICON AND THE ECOLOGY OF MARINE PLANKTON DIATOMS. II. SILICATE-UPTAKE KINETICS IN FIVE DIATOM SPECIES,
Oslo Univ. (Norway). Inst. of Marine Biology; and Oslo Univ. (Norway). Dept. of Limnology.
E. Paasche.
Marine Biology, Vol 19, No 3, p 262-269, April 1973. 10 fig, 2 tab, 22 ref.

Descriptors: *Diatoms, *Silicates, *Absorption, *Kinetics, *Cultures, Phytoplankton, Marine algae, Chrysophyta, Regression analysis, Limiting factors.
Identifiers: *Substrate utilization, Skeletonema costatum, Thalassiosira spp., Ditylum brightwelli, Licomorpha, Culture media, Algal physiology, Algal growth.

The variation of the rate of silicate uptake with varying silicate concentration in the medium was investigated in short-term experiments with the following marine diatom species: Skeletonema costatum, Thalassiosira pseudonana, Thalassiosira decipiens, Ditylum brightwellii, and Licmorphora sp. The uptake conformed to Michaelis-Menten kinetics only after a correction had been made for reactive silicate that apparently could not be utilized by the diatoms. The magnitude of this correction was in the range of 0.3 to 1.3 microgram-at Si/l. Mean values of the half-saturation constant of silicate uptake were calculated for the different species. The lowest value was found in Skeletonema costatum (0.80 microgram-at Si/l) and the highest in Thalassiosira decipiens (3.37 microgram-at Si/l). Growth limitation by low silicate concentrations could be a cause of species succession in marine plankton-diatom blooms. (Holoman-Battelle)
W73-11863

POPULATION AND POLLUTION IN THE UNITED STATES,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 06A.
W73-11869

DISTRIBUTION OF ORGANICS FROM SALMON DECOMPOSITION,
Alaska Univ., College. Inst. of Marine Science.
J. Goering, and D. Brickell.
Available from the National Technical Information Service as PB-222 017, $3.00 in paper copy, $1.45 in microfiche. Alaska Institute of Water Resources, Publication No IWR-34, December 1972, 9 p, 3 ref, append. OWRR A-032-ALAS (1). 14-31-0001-3203.

Descriptors: *Water pollution effects, *Pollutant identification, *Nitrates, *Nitrogen compounds, *Salmon, Marine fish, Estuaries, *Alaska, Water pollution, Food processing industry, Industrial wastes, *Detritus, Decomposing organic matter.
Identifiers: Iliuluik Bay (Alaska).

Cold water ecosystems, such as occur along most of coastal Alaska, are thought to be particularly susceptible to major alterations in biological community structure by seafood processing wastes. The results of a study in Iliuliuk Bay, Alaska, which receives seafood processing wastes, indicate that NH+4 increases drastically in the water while it resides in the bay. A sharp decline in O2 with depth along with the high levels of NH+4 suggests that organic matter accumulating on the bottom is rapidly decomposed. NH+4 levels increase and O2 decreases as the seafood processsing plant is approached from seaward. The chemical dynamics of salmon carcass decomposition in a natural system, i.e., a salmon spawning stream and its associated estuary in southeastern Alaska have also been examined for two years using NH+4 and organic -N as indices of decomposition. Following spawning and death, the majority of the salmon carcasses drifted into the estuary and were deposited on the bottom, closely imitating the situation found at seafood processing plants. The concentrations of NH+4-N and dissolved organic -N in the stream and estuary were relatively low and unvariable before initiation of spawning. During spawning, NH+4-N and organic -N increased and as the number of salmon carcasses increased, the downstream increase in NH+4-N and organic -N became greater. Large increases in organic -N were also noted in the estuary, but NH+4-N remained nearly uniform and did not reflect the immediate effect of carcass decomposition.
W73-11887

APPLICATIONS OF A DERIVED FORMULA FOR THE DISCHARGE OF RADIOACTIVE LIQUID WASTES,
Comitato Nazionale per l'Energia Nucleare, Rome (Italy).

For primary bibliographic entry see Field 05C.
W73-11901

REPORT ON RELEASES OF RADIOACTIVITY IN EFFLUENTS FROM NUCLEAR POWER PLANTS FOR 1971.
Directorate of Regulatory Operations (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Rpt. No. WASH-1198 (1971); $4.00 per copy, $1.45 microfiche. Report No. WASH-1198 (1971). 12 p, 4 tab.

Descriptors: *Effluents, *Nuclear powerplants, *Measurement, *Assay, Data collections, Administrative agencies, Regulation, Radiation, Radioisotopes, Standards, Operations, Toxicity, Safety, Public health, Water pollution, Water pollution sources, Liquid wastes, Gases, Tritium.
Identifiers: Atomic Energy Commission.

A tabulation of radioactivity released in effluents from nuclear power plants for calendar year 1971 is presented. The radioactivity in effluents from licensed nuclear power plants has generally been low in comparison with the permissible limits set forth in the Atomic Energy Commission's Part 20 of Title 10, Chapter 1, Code of Federal Regulations, 'Standards for Protection Against Radiation.' (Houser-ORNL)
W73-11905

ENVIRONMENTAL MONITORING IN THE VICINITY OF THE LOS ALAMOS SCIENTIFIC LABORATORY - CALENDAR YEAR 1972.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 05A.
W73-11909

SOME FEATURES OF THE IMPACT OF A FUSION REACTOR POWER PLANT ON THE ENVIRONMENT,
Argonne National Lab., Ill.
J. E. Draley, and S. Greenberg.
Available from NTIS, Springfield, Va., as CONF-721111-22; $4.00 per copy, $1.45 microfiche. Report CONF-721111-22, Nov 1972. 38 p, 3 fig, 4 tab, 25 ref.

Descriptors: *Tritium, *Nuclear powerplants, *Environmental effects, *Nuclear wastes, Path of pollutants, Feasibility studies, Radioactivity effects, Effluents, Accidents, Hazards, Damages, Forecasting, Systems analysis, Public health.
Identifiers: Fusion powerplants.

As compared with fission plants, a reference fusion plant (470 megawatts electric) (1) requires no fuel-reprocessing plant, (2) accumulates greater radioactivity in structural materials, and (3) will likewise have very low tritium leakage. It is assumed that the use of an unspecified technique (such as a hot diffuser wall) will keep the tritium concentration as low as 1 ppm in the lithium heat-transfer fluid in the primary circuit. The major tritium release (about 2.6 Curies/day) will occur in steam blowdown. This compares with 11 Curies/day for Pressurized Water Reactors and 0.13 Curie/day for Boiling Water Reactors, both augmented by 34 Curies/day at fuel reprocessing plants. The maximum credible accident will release about 7 million Curies over a 3-day period, giving a maximum dose at the site boundary of 45 mrem for average meteorologic conditions, ranging to 13 rems for unfavorable conditions. (Bopp-ORNL)
W73-11910

THE MOVEMENT OF PHOSPHOROUS IN THE LITTLE RIVER ESTUARY, NEW SOUTH WALES,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
M. S. Giles.
Available from NTIS, Springfield, Va., as AAEC/TM 616; $4.00 in paper copy, $1.45 microfiche. Report AAEC/TM 616, October 1972. 19 p, 7 fig, 2 tab, 15 ref.

Descriptors: *Estuarine environment, *Radioecology, *Phosphorus radioisotopes, *Phytoplankton, Zooplankton, Nuclear wastes, Food chains, Feasibility studies, Path of pollutants, Saline water intrusion, Environmental effects, Turnovers, Storm runoff, Stratification, Mixing, Biomass, Salinity, Chlorophyll, Australia, Tritium.

It appears feasible to define critical radionuclide pathways for human exposure using tracer experiments. As an example a study was conducted in a small estuary for which the biomass was limited by rapid environmental changes (freshwater runoff, marine water incurion, anaerobic conditions in the deeper layers in summer). Macrophytic algae were absent. Added soluble P32 was taken up by phytoplankton with a turnover time of about 2 hr. Flushing of the phytoplankton by the tides caused loss of at least 90% of the P32. Loss of tritiated water tracer was somewhat more rapid. Zooplankton were not flushed by the tides and retained part of the P32. (Bopp-ORNL)
W73-11912

THE POTENTIAL RADIOLOGICAL IMPLICATIONS OF NUCLEAR FACILITIES IN THE UPPER MISSISSIPPI RIVER BASIN IN THE YEAR 2000.
Division of Reactor Development and Technology (AEC), Washington, D.C.

Available from Supt. of Documents, Govt. Printing Office, Washington, D.C. Report WASH-1209, January 1973. 244 p, 122 fig, 59 tab, 159 ref, 5 append.

Descriptors: *Nuclear powerplants, *Effluents, *Radioisotopes, *Air pollution, *Water pollution, *Water pollution sources, *Soil contamination, Forecasting, Public health, Assay, Food chains, Monitoring, Mississippi River, River basins, Meteorology, Hydrology, Topography, Population, Distribution patterns.
Identifiers: *Mississippi River Basin.

This study considers the radiation potentially received by the population of the upper Mississippi River Basin study area which might result from the operation of nuclear power and fuel reprocessing facilities in the yr 2000. The results of the study based on the selected radioactive-waste-treatment systems showed that, on the average throughout the region, the potential radiation an average individual could receive in the year 2000 would be increased by roughly 0.2 millirem/year because of the presence of nuclear facilities. (Houser-ORNL)
W73-11918

DETERMINATION OF THE DIFFUSION COEFFICIENT OF RADIOELEMENTS IN THE RHONE SEDIMENTS,
National Inst. of Radiological Sciences, Chiba (Japan).
M. Ijuin, P. Picat, A. Saas, and A. Grauby.
Health Physics, Vol 24, p 665-672, June 1973. 12 fig, 2 tab, 15 ref.

Descriptors: *Nuclear wastes, *Path of pollutants, *Sediments, *Absorption, Strontium radioisotopes, Zinc radioisotopes, Cobalt radioisotopes, Diffusion, Penetration, Ion transport, Rivers, Water pollution, Cores, Dating.
Identifiers: Cerium radioisotopes, Cesium radioisotopes, Manganese radioisotopes.

Sediments that were characterized by analysis for 9 major metals and 5 trace metals were contacted at the surface with radionuclide solutions for 11-147 days. Most of the Ce141, Co60, Cs137, and Zn65 was sorbed near the surface; but at lower depth the depth-concentration relation followed Fick's second law of diffusion. Stirring the solution affected the surface sorption but not the diffusion coefficient. The high Ca content of the sediments is believed to decrease the surface sorption of Sr85 such that Fick's law applied over the entire core. Surface sorption was also absent for Mn54 after 39 days but not after 147 days. Analysis of sediment cores for radionuclides with low diffusion coefficients (D) (such as Sr85 for which D is about 0.021 sq. cm/day) may prove useful for dating sediments. (Bopp-ORNL)
W73-11921

RADIOLOGICAL STATUS OF THE GROUNDWATER BENEATH THE HANFORD PROJECT - JULY-DECEMBER, 1971,
Battelle-Pacific Northwest Labs. Richland, Wash.
For primary bibliographic entry see Field 05A.
W73-11923

ENVIRONMENTAL SURVEILLANCE AT HANFORD FOR CY-1972,
Battelle-Pacific Northwest Labs. Richland, Wash.
For primary bibliographic entry see Field 05A.
W73-11924

EFFECT OF DIVERSION OF DOMESTIC WASTE WATERS ON PHOSPHORUS CONTENT AND EUTROPHICATION OF THE MADISON LAKES,
Wisconsin Univ., Madison. Water Chemistry Program.
For primary bibliographic entry see Field 05C.
W73-11946

PRESERVING THE GREAT LAKES,
Resources Development Consultants, Inc. Fort Collins, Colo.
G. J. Kelnhofer, Jr.
Available from the National Technical Information Service as PB-211 442, $4.85 in paper copy, $0.95 in microfiche. National Water Commission, Arlington, Virginia, Report NWC-SB-72-052, May 1972. 73 p, 50 ref. NWC 72-010.

Descriptors: *Water quality control, *Great Lakes, Environment, Institutions, Model studies, Pollution abatement, Eutrophication, Planning, Coordination, Management, Federal government, Water pollution sources, Economics, State jurisdiction, Social aspects, Programs, Water level fluctuations, Diversion losses, Fisheries, Administration, Conferences, International commission, Water quality standards, Waste water treatment, Analytical techniques, Water policy, International Joint Commission, Political constraints.
Identifiers: Institutional design, Multipurpose uses, Limnological systems analysis, Great Lakes Basin Commission.

The Great Lakes' present environmental conditions are reviewed and contributing factors assessed. Probably the most vital missing ingredient about the severity of damage being inflicted and about efficacy of the remedies employed is knowledge of the Lakes' function. More urgent than data gathering now is need of analytical tools to make effective use of the data already acquired. Data should be organized and systematized into a model or models simulating the Lakes' processes and illustrating their function. It is recommended that Federal funds for research be allocated to the Great Lakes Basin Commission for at least five years to develop methods for analyzing the impact of alternative pollution abatement measures. Before information about what could be done or should be done can affect performance, there must be a means for using the information. This implies a management organization or organizations with capability of utilizing such information to make decisions resulting in an improved en-

vironment. The institutional arrangements should include a systemwide organization and five lake organizations with each lake represented by its own council. Systemwide, the Great Lakes council (or board) should serve as integrating body for the councils. (Jones-Wisconsin)
W73-11955

NUTRIENT SOURCES FOR LAKE MENDOTA--1972,
Wisconsin Univ., Madison. Water Chemistry Program.
W. C. Sonzogni, and G. F. Lee.
Report (Undated). 49 p. 2 fig, 15 tab, 55 ref. (1972) EPA R-801360.

Descriptors: *Water quality control, *Eutrophication, *Nutrients, *Lakes, Wisconsin, Land use, Base flow, Tributaries, Agricultural runoff, Nitrogen, Phosphorus, Denitrification, Runoff, Measurement, Urban runoff, Precipitation (Atmospheric), Nitrogen fixation, Marshes, Trees, Waste water (Pollution), Sewage treatment, Fallout, Leaves, Erosion, Industrial wastes, Domestic wastes, Urbanization.
Identifiers: Nutrient sources, *Lake Mendota (Wis).

To evaluate the effects of changes in population, watershed land use, and recent diversion of sewage effluents which had entered the tributaries of Lake Mendota, Wisconsin, the total amounts of nutrients entering the lake and quantitative information on the forms and sources of nutrients are updated from 1966 estimates. Contributions from base flow, rural runoff, urban drainage (including phosphorus contribution from leaves, seeds from trees, and flowers) and industrial drainage are estimated. A comparison of 1972 estimates to those of 1966 for atmospheric precipitation and dry fallout indicates that they are significantly higher than originally published. Control of these diffuse nutrient sources at site of origin is suggested for agricultural and stormwater runoff. The Dane County Planning Commission acted to prevent urban development of Lake Mendota's watershed because of the fear that conversion of farm land to urban usage would increase the nutrient flux to the lake. A proposed law would prevent winter spreading of manure from dairy operations and draining of marshland for agricultural or urban use. The real significance of the various nutrient forms which are or can be available for aquatic growth, i.e., particulate, organic, etc., is the basis for designing meaningful eutrophication control programs. (Auen-Wisconsin)
W73-11960

SIMULATION OF HYDROLOGIC AND CHEMICAL-QUALITY VARIATIONS IN AN IRRIGATED STREAM-AQUIFER SYSTEM--A PRELIMINARY REPORT,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 02A.
W73-12024

POTENTIAL FOR GROUND WATER POLLUTION FROM THE LAND DISPOSAL OF SOLID WASTES,
Marquette Univ., Milwaukee, Wis. Dept. of Civil Engineering.
A. E. Zanoni.
Critical Reviews in Environment Control, Vol 3, Issue 3, p 225-260, May 1973. 5 fig, 14 tab, 139 ref.

Descriptors: *Water pollution sources, *Landfills, *Path of pollutants, *Groundwater, Groundwater movement, Leaching, Percolation, Infiltration, Garbage dumps, Biodegradation, Water pollution.

Man has been using the land for disposal of his solid wastes since he first began to generate these materials. Today sanitary landfill is the most common method for solid waste disposal. Once deposited, microorganisms in the presence of moisture begin to decompose the organic fraction of the solid waste. If sufficient water enters the refuse mass, either from the infiltration of rainwater or by the rising of the groundwater table, the end products of this microbial activity, plus the simple solution of the other materials from the inert fraction of the solid wastes, leach out of the refuse mass. Depending upon the hydrogeology of the landfill site, this leachate has the potential for polluting the groundwater. Fortunately, the soil regime provides an ideal environment for the attenuation of the leachates as a result of a combination of biological, chemical, and physical forces. It is possible to employ hydrogeological techniques to evaluate a potential landfill site and thus minimize the possibility of groundwater pollution. Also, more serious consideration is being given today to modifying a site or controlling the landfill operation, through the use of such techniques as leachate barriers, high rate stabilization, and leachate collection and treatment. (Knapp-USGS)
W73-12025

THE EFFECTS OF PLUGGING A DEEP ARTESIAN WELL ON THE CONCENTRATION OF CHLORIDE IN WATER IN THE WATER-TABLE AQUIFER AT HIGHLAND ESTATES, LEE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 02F.
W73-12039

GEOLOGY FOR PLANNING IN ST. CLAIR COUNTY, ILLINOIS.
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 02F.
W73-12069

MOVEMENT AND QUALITY OF LONG ISLAND SOUND WATERS, 1971,
State Univ., of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 02K.
W73-12072

WATER QUALITY SURVEY OF THE POTOMAC ESTUARY EMBAYMENTS AND TRANSECTS.
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.
For primary bibliographic entry see Field 05A.
W73-12077

WATER QUALITY OF THE POTOMAC ESTUARY GILBERT SWAMP AND ALLEN'S FRESH AND GUNSTON COVE.
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.
For primary bibliographic entry see Field 02K.
W73-12078

STUDIES ON FRESHWATER MICRO-ORGANISMS: PHOSPHATASE ACTIVITY IN LAKES OF DIFFERING DEGREES OF EUTROPHICATION,
Freshwater Biological Association, Windermere (England).
For primary bibliographic entry see Field 05C.
W73-12089

LOCATION AND CONSEQUENCES OF 1,1,1--TRICHLORO-2,2-BIS (P-CHLOROPHENYL) ETHANE UPTAKE BY BACILLUS MEGATERIUM,
Michigan State Univ., East Lansing. Dept. of Microbiology and Public Health.
G. F. Hicks, Jr., and T. R. Corner.
Applied Microbiology, Vol 25, No 3, p 381-387, March 1973. 4 fig, 1 tab, 22 ref.

Descriptors: *DDT, *Pesticide toxicity, *Soil bacteria, *Absorption, Chlorinated hydrocarbon pesticides, Insecticides, DDD, Respiration, Lethal limit, Separation techniques.
Identifiers: *Bacillus megaterium, *Bioaccumulation, Bacterial physiology, Metabolites, Survival, Chemical recovery, 1 1 1-Trichloro-2 2-bis (p-chlorophenyl)ethane, Substrate utilization, Electron capture gas chromatography, 1 1-Dichloro-2 2-bis (p-chlorophenyl)ethane, Sample preparation.

No detrimental effects of 1,1,1-trichloro-2,2-bis (p-chlorophenyl)ethane (DDT) were observed when cells of Bacillus megaterium were grown from small inocula in nutrient media containing up to 100 micrograms of DDT/ml. However, when the ratio of DDT to biomass of resting cells was held constant, levels of DDT as low as 1 microgram/ml (0.5 microgram/mg of cell dry weight) enhanced the rate of death in the population. The lethal action of DDT was both time- and dose-dependent so that higher doses required less time to effect the same killing than did lower doses. Intact cells bound a maximum of about 1.7 micrograms of DDT/mg of cell dry weight, of which about 75 percent was localized in the protoplast membrane. Much of the bound DDT was subsequently lost to the suspending medium and the aqueous stability of the returned DDT was enhanced, possibly by association with solubilized cell materials. A small quantity of bound DDT was converted to 1,1-dichloro-2,2-bis (p-chlorophenyl)ethane, which was released from cells somewhat faster than DDT. Apparently the lethal action of DDT was related to its binding in the membrane, but respiration was not inhibited. The atypical macroscopic appearance of membranes isolated from treated cells suggested that cell death may result from altered membrane chemistry. (Holoman-Battelle)
W73-12091

ACCUMULATION OF DIELDRIN IN AN ALGA (SCENEDESMUS OBLIQUUS), DAPHNIA MAGNA AND THE GUPPY (POECILIA RETICULATA),
Michigan Univ., Ann Arbor. School of Natural Resources.
R. E. Reinert.
Journal of the Fisheries Research Board of Canada, Vol 29, No 10, p 1413-1418, October 1972. 7 fig, 11 ref.

Descriptors: *Dieldrin, *Chemical analysis, *Absorption, Water analysis, Aquatic algae, Waterfleas, Chlorinated hydrocarbon pesticides, Insecticides, Chlorophyta, Crustaceans, Aquatic animals, Invertebrates, Pollutant identification, Water analysis, Laboratory tests, Bioassay, Solvent extractions, Killifishes, Freshwater fish.
Identifiers: *Bioaccumulation, *Scenedesmus obliquus, *Daphnia magna, *Poecilia reticulata, Guppy, Macroinvertebrates, Electron capture gas chromatography, Sample preparation.

Scenedesmus obliquus, Daphnia magna, and Poecilia reticulata were exposed in the laboratory to different concentrations of dieldrin in water or food. After various periods of exposure, dieldrin was extracted with hexane and quantified by electron capture gas chromatography. Extraction efficiencies were determined from the analysis of 5 samples each of water or organisms to which known amounts of dieldrin had been added. The organisms accumulated dieldrin directly from water; average concentration factors (concentration in organism, dry weight, divided by concentration in water) were 1282 for the algae, 13,954 for Daphnia magna and 49,307 (estimated) for the guppy. The amount accumulated by each species at equilibrium (after about 1.5, 3-4 and 18 days, respectively) was directly proportional to the concentration of dieldrin in the water. Daphnia magna and guppies accumulated more dieldrin from water than from food that had been exposed to similar concentrations in water. When guppies were fed equal daily rations of Daphnia magna containing different concentrations of insecticide, the

amounts of dieldrin accumulated by the fish were directly proportional to the concentration in Daphnia magna; when two lots of guppies were fed different quantities of Daphnia magna (10 and 21 organisms per day) containing identical concentrations of dieldrin, however, the amounts accumulated did not differ substantially. (Holoman-Battelle)
W73-12098

TURNOVER AND VERTICAL TRANSPORT OF ZINC BY THE EUPHAUSIID MEGANYCTIPHANES NORVEGICA IN THE LIGURIAN SEA,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco).
L. F. Small, and S. W. Fowler.
Marine Biology, Vol 18, No 4, p 284-290, February 1973. 2 fig, 6 tab, 16 ref.

Descriptors: *Zinc, *Path of pollutants, Heavy metals, Food abundance, Sea water, Mathematical models, Marine animals, Invertebrates.
Identifiers: *Transport, *Meganyctiphanes norvegica, Feces, Turnover, Ligurian Sea, Bioaccumulation, Elimination, Biotransformation, Molts, Carcasses, Vertical transport, Euphausiids, Macroinvertebrates, Mysids.

The participatory turnover time of ionic zinc by the adult Meganyctiphanes norvegica population in the Ligurian Sea ranged between 498 and 1243 years, depending upon the available food supply, and considering the food chain as the only route for zinc accumulation by the population. A total impact turnover time was calculated as the sum of the participatory turnover time for live individuals plus the time required for dead euphausiids to lose 90 percent of their zinc to the water. The net vertical transport of zinc by Meganyctiphanes norvegica from the sea surface to any specified depth can be calculated as the sum of the dissolved zinc excreted below the depth plus the concentrations of zinc left in feces, molts and carcasses after they have sunk to the specified depth. Feces represents the major route for delivering zinc to the bottom of the Ligurian Sea (2500 m) because concentration of the element in the pellets is so much higher than in carcasses or molts. Feces zinc represented over 80 percent of the total zinc transported to the sea floor if only marginal food supplies were available to the euphausiids, and over 90 percent if food was in sufficient supply. (Little-Battelle)
W73-12114

DELAYED-INCUBATION MEMBRANE-FILTER TEST FOR FECAL COLIFORMS,
Environmental Protection Agency, Cincinnati, Ohio. Water Supply Research Lab.
For primary bibliographic entry see Field 05A.
W73-12120

AMMONIA ASSIMILATION IN BLUE-GREEN ALGAE,
California Univ., Berkeley. Dept. of Bacteriology and Immunology.
A. H. Neilson, and M. Doudoroff.
Archiv fur Mikrobiologie, Vol 89, No 1, p 15-22, January 18, 1973. 6 tab, 23 ref.

Descriptors: *Ammonia, *Cyanophyta, *Aquatic algae, *Nitrogen compounds, Enzymes, Assay, Anabaena, Amino acids, Nitrates, Nitrogen, Cultures, Nutrient requirements.
Identifiers: *Assimilation, *Fate of pollutants, Substrate utilization, L-alanine, L-glutamine, L-asparagine, Sample preparation, L-glutamate, Synechococcus, Lyngbya, Oscillatoria, Microchaete, Aphanocapsa, Plectonema, Chlorogloeopis, Gloeocapsa, Microcystis, Calothrix.

The occurrence of alanine dehydrogenase (AlaDH), glutamate dehydrogenase (GDH), and 2-ketoglutarate:glutamine amidotransferase (GGAT), has been surveyed in a number of blue-green algae. Among nine unicellular strains grown with nitrate, and belonging to five of the major typological groups, AlaDH was present in seven, and GDH in all eight that were assayed. In ten filamentous strains grown with nitrate, and belonging to the three nonheterocyst-forming and four heterocyst-forming groups, AlaDH was present in six, but both AlaDH and GDH were present in only one strain. In those strains which could be grown with N2 as sole nitrogen source, levels of GDH were generally lower, and AlaDH higher in cells fixing N2 than in those growing with nitrate. GGAT was undetectable in N2-grown cells. Two unicellular and three filamentous strains were tested for their ability to use L-alanine, L-glutamate, L-glutamine, and L-asparagine as sole sources of nitrogen. Of these, L-asparagine was utilized most effectively. There was little difference in levels of GDH in cells grown with nitrate or with L-asparagine, while the levels of AlaDH were slightly lower in cells grown with L-asparagine. (Holoman-Battelle)
W73-12125

OCCURRENCE AND DISTRIBUTION OF CYANOPHAGES IN PONDS, SEWAGE AND RICE FIELDS,
Central Rice Research Inst., Cuttack (India). Dept. of Blue-Green Algae.
For primary bibliographic entry see Field 05A.
W73-12126

EFFECT OF NITRATE, AMMONIA AND NITROGEN STARVATION ON THE REGULATION OF NITRATE REDUCTASE IN CYANIDIUM CALDARIUM,
Naples Univ. (Italy). Istituto di Botanica.
For primary bibliographic entry see Field 05C.
W73-12130

FEASIBILITY OF REMOTE DETECTION OF WATER POLLUTANTS AND OIL SLICKS BY LASER-EXCITED RAMAN SPECTROSCOPY,
Rhode Island Univ., Kingston. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-12137

METABOLISM OF PHENOL AND CRESOLS BY MUTANTS OF PSEUDOMONAS PUTIDA,
Monash Univ. Medical School, Prahran (Australia). Alfred Hospital.
R. C. Bayly, and G. J. Wigmore.
Journal of Bacteriology, Vol 113, No 3, p 1121-1120, March 1973. 2 fig, 7 tab, 25 ref.

Descriptors: *Phenols, *Metabolism, *Microbial degradation, Enzymes, Assay, Degradation (Decomposition), Aerobic bacteria.
Identifiers: *Cresol, *Pseudomonas putida, *Mutants, Bacterial physiology, Substrate utilization, 2-hydroxymuconic semialdehyde hydrolase, Growth media, Culture media, Mutagenesis, Catechol 2 3-oxygenase, NAD-aldehyde dehydrogenase.

Mutant strains of Pseudomonas putida strain U have been obtained which are deficient in enzymes of the degradative pathways of phenol and cresols. Mutant strains deficient in catechol 2,3-oxygenase accumulated the appropriate catechol derivative from cresols. A mutant strain which would not grow on either phenol or a cresol was shown to be deficient in both 2-hydroxymuconic semialdehyde hydrolase and a nicotinamide adenine dinucleotide, oxidized form, (NAD)-dependent aldehyde dehydrogenase. When this strain was grown in the presence of phenol or a cresol, the appropriate product of meta fission of these compoujnds accumulated in the growth medium. A partial revertant of this mutant strain, which was able to grow on ortho- and meta-cresol but not para-cresol, was shown to have regained only the hydrolase activity. This strain was used to show that the products of meta ring fission of the cresols and phenol are metabolized as follows: (1) ortho- and meta-cresol exclusively by a hydrolase; (2) para-cresol exclusively by a NAD-dependent aldehyde dehydrogenase; (3) phenol by both a NAD-dependent dehydrogenase and a hydrolase in the approximate ratio of 5 to 1. This conclusion is supported by the substrate specificity and enzymatic activity of the hydrolase and NAD-dependent aldehyde dehydrogenase enzymes of the wild-type strain. The results are discussed in terms of the physiological significance of the pathway. Properties of some of the mutant strains isolated are discussed. (HOoloman-Battelle)
W73-12139

POTENTIAL PATHOGENS IN THE ENVIRONMENT: ISOLATION, ENUMERATION, AND IDENTIFICATION OF SEVEN GENERA OF INTESTINAL BACTERIA ASSOCIATED WITH SMALL GREEN PET TURTLES,
Oregon State Univ., Corvallis. Dept. of Microbiology.
For primary bibliographic entry see Field 05A.
W73-12150

MICROBIOLOGICAL QUALITY OF SURFACE DRAINAGE WATER FROM THREE SMALL IRRIGATED WATERSHEDS IN SOUTHERN IDAHO,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
For primary bibliographic entry see Field 05C.
W73-12151

BUTOMUS UMBELLATUS IN THE MISSISSIPPI WATERSHED,
Ohio State Univ., Columbus. Dept. of Botany.
For primary bibliographic entry see Field 02I.
W73-12176

CHEMICAL CHARACTERISTICS OF UNDERGROUND CHALK WATER IN ESSEX AND SUFFOLK,
Essex River Authority (England).
K. Guiver.
Water Treat Exam. Vol 21, No 1, p 30-43. 1972. Illus.
Identifiers: Chalk water, Chemical characteristics, *England (Essex River), Groundwater, Infiltration, Saline water intrusion, Suffolk.

The results of analysis of a large number of samples taken from chalk boreholes are correlated for the Essex River Authority area. A general pattern of water quality is developed and associated with the London clay covering the chalk. Some discussion on the effects of saline infiltration and the annual variations of water quality expected from varying rainfall infiltration is given.–Copyright 1972, Biological Abstracts, Inc.
W73-12180

MERCURY: VERTICAL DISTRIBUTION AT TWO LOCATIONS IN THE EASTERN TROPICAL PACIFIC OCEAN,
Naval Undersea Research and Development Center, San Diego, Calif.
H. V. Weiss, S. Yamamoto, T. E. Crozier, and J. H. Mathewson.
Environ Sci Technol. Vol 6, No 7, p 644-645. 1972.
Identifiers: Coasts, *Mercury, *Mexico (West Coast), *Pacific Ocean, *Vertical distribution.

Hg concentrations at 2 locations off the west coast of Mexico were determined in the water column. At a station 60 km from the shore, pronounced fluctuations and greater Hg concentrations, 22-173 ng/kg, were measured compared with samples

taken 150 km from the coast in which the concentration range was 12-27 ng/kg.--Copyright 1972, Biological Abstracts, Inc.
W73-12186

MERCURY LEVELS IN MARINE BIOTA,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 05C.
W73-12195

SOIL CHANGES CAUSED BY EROSION CONTROL TREATMENTS ON A SALT DESERT AREA,
New Brunswick Univ., Fredericton. Dept. of Biology.
For primary bibliographic entry see Field 02G.
W73-12249

ENVIRONMENTAL STATEMENT, RIO BLANCO GAS STIMULATION PROJECT, RIO BLANCO COUNTY, COLORADO.
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-12258

RADIONUCLIDES IN RIVER SYSTEMS,
Oak Ridge National Lab. Tenn.
D. J. Nelson, S. V. Kaye, and R. S. Booth.
In: River Ecology and Man (R.T. Oglesby and C.A. Carlson, Eds.), Academic Press, New York, 1972, p 367-387. 1 fig, 3 tab, 35 ref.

Descriptors: *Nuclear wastes, *Path of pollutants, *Rivers, *Effluents, Radioisotopes, Absorption, Food chains, Systems analysis, Sediments, Aquatic life, Forecasting, Radioecology, Radioactivity techniques, Tennessee, Public health, *Tennessee.
Identifiers: *Clinch River.

Experience with radionuclides in the Clinch River is reviewed briefly. The specific- activity-concept for prediction of uptake by aquatic organisms requires that stable and radioactive atoms are available to the same degree. To the extent that time factors are neglected, an overestimate may be obtained. Other schemes for modelling uptake by organisms and modelling of transport and retention by streams are described. Sources of radionuclide discharges to rivers are mentioned (nuclear power stations, fuel reprocessing plants, research laboratories, testing of weapons and the use of nuclear explosive for evacuation). (Bopp-ORNL)
W73-12259

INVESTIGATIONS OF THE FATE OF CERTAIN PESTICIDES UNDER BIOTIC AND ABIOTIC CONDITIONS USING TRACER TECHNIQUES,
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Neuherberg bei Munich (West Germany).
F. Korte, W. Klein, A. Suess, and H. Siegmund.
Available from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016; $6.00 for proceedings. In: Radiotracer Studies of Chemical Residues in Food and Agriculture, International Atomic Energy Agency, Vienna, p 35-45, 1972, 11 fig, 2 tab.

Descriptors: *Environmental effects, *Aldrin, *Insecticides, *Plant physiology, Radioactivity techniques, Carbon radioisotopes, Metabolism, Soil moisture, Leaching, Sorption, Analytical techniques, Pollutant identification, Chromatography, Pesticide residues, Soil contamination, Water pollution, Tracers, Marking techniques.

An example of the need to include conversion products in evaluation of environmental effects is given by this study of plant metabolism of C14-labeled aldrin insecticide. The water-soluble metabolite dihydrochlordene dicarboxylic acid constituted 20% of the residue in potatoes and about 40% in maize leaves, and metabolites constituted 80% of the residue in peeled beets and the leaves. (Bopp-ORNL)
W73-12261

UPTAKE OF MERCURY BY PLANTS AND ITS DISTRIBUTION IN LIVING ORGANISMS IN AN ENVIRONMENT WITH INCREASED CONCENTRATION OF THIS ELEMENT,
Ljubljana Univ. (Yugoslavia).
For primary bibliographic entry see Field 05C.
W73-12262

SOME REMARKS ON MERCURY AS AN AQUATIC POLLUTANT AND ITS IMPLICATIONS,
Helsinki Univ. (Finland). Dept. of Radiochemistry
For primary bibliographic entry see Field 05C.
W73-12263

CADMIUM CONTENT OF SEA WATER, BOTTOM SEDIMENT AND FISH, AND ITS ELIMINATION RATE IN FISH,
Helsinki Univ. (Finalnd). Dept. of Radiochemistry.
T. Jaakkola, H. Takahashi, R. Soininen, K. Rissanen, and J. K. Miettinen.
Available from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016; $6.00 for proceedings.

Descriptors: *Cadmium, *Environmental effects, *Estuarine environment, *Marine fish, Absorption, Food chains, Toxicity, Radioecology, Public health, Sediments, Mine water, Mineral industry, Mine wastes, Mills, Sculpins, Pikes, Water pollution sources, Water pollution effects, Industrial wastes, Path of pollutants, Monitoring.

Cadium levels were measured in unpolluted Finnish coastal waters (0.1-0.2 ppb in water, 3-10 ppb in dried organic sediments) and in a polluted area where a Zn refinery had been operating for 6 months and ore boats had been loaded for 6 years (5-20 ppb in water, 15-130 ppb in sediment). It appears that careful monitoring will be required to ensure that levels do not become hazardous (in Tsushima, Japan, 225 ppb in well water is suspected to have caused disease). In fish taken from polluted areas, the concentration in muscle was 10-70 ppb; in fish from unpolluted areas, 2-3 ppb. About 1% of a catheter-administered dose was retained by rainbow trout after 42 days with a relatively long biological half-time. (Bopp-ORNL)
W73-12264

SIGNIFICANCE OF MERCURY IN THE ENVIRONMENT: SUGGESTIONS FOR FURTHER RESEARCH,
Department of Agriculture, Saskatoon (Saskatchewan).
For primary bibliographic entry see Field 05C.
W73-12265

REACTIONS OF HERBICIDES WITH SOIL AND PLANTS,
Bayerische Landesanstalt fuer Bodenkultur, Pflanzenbau und Pflanzenschutz, Munich (West Germany).
A. Suss, H. Siegmund, C. Eben, and B. Grampp.
Available from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016; $6.00 for proceedings. In: Radiotracer Studies of Chemical Residues in Food and Agriculture, International Atomic Energy Agency, Vienna, p 111-121, 1972, 16 fig, 1 tab, 2 ref.

Descriptors: *Vegetable crops, *Food chains, *Herbicides, *Absorption, Soil bacteria, Microbial degradation, Analytical techniques, Chromatography, Path of pollutants, Pollutant identification, Soil moisture.
Identifiers: Bacillus sphaericus, Thin layer chromatography.

C14-labelled herbicides (momolinuron, pyrazon and simazine) were used to study degradation by soil bacteria and uptake by mustard plants. Further work is needed to show whether contamination of food may result from plant uptake. During 24 days of growth, mustard plants absorbed 6% of the radioactivity from 5-ppm-labelled monolinuron in soil with 45-75% moisture; 5% with 30% moisture. One of the main metabolites formed by Bacillus sphaericus was 4-chloraniline, a possible precursor of hazardous diazo substances. (See also W72-14304). (Bopp-ORNL)
W73-12266

A SIMPLE METHOD FOR THE ACTIVATION ANALYSIS OF MERCURY IN FISH: MERCURY CONTENT IN VENEZUELAN CANNED TUNA,
Instituto Venezolano de Investigaciones Cientificas, Caracas.
For primary bibliographic entry see Field 05A.
W73-12267

A PLAN FOR THE CONSTRUCTION AND TESTING OF WATER POLLUTION FORECASTING MODELS,
Missouri Univ., Columbia. Dept. of Industrial Engineering.
L. G. David, and O. W. Miller.
In Proceedings (Vol I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972, p 159-175 (1972). 2 fig, 5 tab, 3 ref.

Descriptors: *Water quality control, *Streams, *Water pollution, *Forecasting, *Mathematical models, Data collections, Planning, Construction, Testing, Systems analysis, Pollutants, *Missouri.
Identifiers: *Cuivre River Basin (Missouri), Pollutant concentration level.

The overall objective of water pollution control in the U.S. must be the effective control of the level of pollutants. A study is presented in which the kinds of water quality data presently being collected and available for analysis, and the degree of dependency relationship existing among the variables are determined. The objective is to develop a plan for constructing and testing a stream pollutant forecasting model. Chosen as the river basin for which to develop the plan was the Cuivre River (Missouri). Federal and State agencies are actively collecting data which may be used to predict the degree of pollutant contamination in a river basin. The Missouri Water Pollution Control Board recently completed a stream survey for the Cuivre River Basin, including the degree of concentration of 28 different pollutants. Rainfall data for this region is available from the U.S. National Weather Service. Agricultural inventory data is available from the University of Missouri for this area, and water quality data for this region is published by the U.S. Geological Survey. A step-by-step procedure is outlined for construction and evaluation of a comprehensive stream pollutant forecasting model which may be effective in forecasting the degree of pollutant concentration using, as much as possible, data from the agencies listed above. (See also W73-12269) (Bell-Cornell)
W73-12281

THE QUALITY OF COASTAL WATERS: FIRST ANNUAL PROGRESS REPORT,
Hawaii Univ., Honolulu. Water Resources Research Center.
L. S. Lau.
Available from NTIS, Springfield, Va. 22151 as COM-73-10144 Price $3.00 printed copy; $1.45 microfiche. Technical Report No. 60, September 1972. 213 p, 48 fig, 68 tab, 49 ref, 3 append. NOAA UNIHI-SG-72-01.

Descriptors: *Water quality, *Coasts, *Hawaii, *Water pollution sources, Environmental effects,

Land use, Urbanization, Industrial wastes, Municipal wastes, Sediments, Estuaries, Bays, Ecology, Economic aspects, Social aspects, Data collections, Evaluation, Water pollution effects, Hydrology, Oceanography.

The nature and results of the first year of study on the Coastal Water Quality project of the University of Hawaii's Sea Grant Program are summarized. The project is a multidirectional, multidisciplinary study directed to the general objectives of identifying and evaluating the social political, economic, educational, institutional, and scientific and technological factors which impede or expedite the protection and restoration of coastal water environments in Hawaii. Kahana Bay was selected as a coastal water under the influence of relatively undeveloped land. Sugarcane prodection and milling wastes were studied on Kauai. The effects of urban waste water, especially sewage, were studied with the city and county of Honolulu and the federal agencies engaged in major investigations and projects such as sewage treatment at Sand Island, Pearl Harbor, Kaneohe Bay, and Mokapu Point. The identification and evaluation of the separate effects of various land uses on the quality of coastal waters is interpreted in terms of changes in the institutional, economic, and social systems needed to achieve the environmental objectives of the state. (Woodard-USGS)
W73-12295

THE DISTRIBUTION OF DISSOLVED MERCURY IN THE BRISTOL CHANNEL AND SEVERN ESTUARY,
Liverpool Univ. (England). Dept. of Oceanography.
D. Gardner, and J. P. Riley.
Estuarine and Coastal Marine Science, Vol 1, No 2, p 191-192. April 1973. 1 fig, 11 ref.

Descriptors: *Mercury, *Path of pollutants, *Estuaries, Water chemistry, Adsorption, Bottom sediments, Distribution patterns, Sampling, Water analysis, Water chemistry.
Identifiers: *Severn Estuary (England).

The concentration of dissolved and particulate mercury was determined in the Bristol Channel and Severn Estuary, England. The distribution of both forms of the element are consistent with the water circulation pattern. The range of concentrations found below Cardiff is very similar to that observed for the sea. On passing downstream from Cardiff the dissolved mercury concentration drops from >50 mg per liter to values of <10 mg per liter in the central area of the Bristol Channel. Seawards of this region the concentrations rises to levels of 30-50 ng per liter which are similar to those found in the Southern Irish Sea. The very strong adsorptive affinity of particulate matter for mercury probably plays an important part in the establishment of this distribution pattern. Dissolved mercury contained in effluents will be rapidly taken up by the suspended sediment in the river. Consistent with this picture particulate mercury was found to range from >200 ng per liter around Cardiff down to values of approximately 100 ng per liter around a line between Nash Point and Porlock. (Knapp-USGS)
W73-12301

THE ENVIRONMENTAL IMPACT OF GROUND WATER USE ON CAPE COD--IMPACT STUDY NO. 3,
A. N. Strahler.
The Association for the Preservation of Cape Cod, Inc, Orleans, Mass, 1972. 68 p, 1 plate, 24 fig, 2 tab, 6 ref. Price: $1.25.

Descriptors: *Water resources development, *Massachussetts, *Hydrogeology, Withdrawal, Saline water intrusion, Water pollution sources, Environmental effects, Water balance, Water yield.
Identifiers: *Cape Cod (Mass).

Groundwater (including pond water) is Cape Cod's only natural source of freshwater. Development of this water supply to meet needs, and at the same time to preserve the high quality of the groundwater and the water level of the freshwater ponds, requires strict attention to the basic principles of groundwater movement and recharge. Cape Cod has escaped noticeable lowering of the water table because of the return of a large proportion of used water through domestic wells in conjunction with these individual septic tank units has dispersed the sources of water withdrawal and at the same time effectively returned much of the used water close to the points of extraction. If development proceeds, first by installation of town water systems, then by installation of sanitary sewer systems with ocean outfall, the situation will deteriorate. (Knapp-USGS)
W73-12303

ANGULAR DEPENDENCE OF SUBSTITUENT EFFECTS IN RIGID, BICYCLIC SYSTEMS,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
For primary bibliographic entry see Field 02K.
W73-12305

REMOTE SENSING STUDY OF THERMAL DISCHARGES TO LAKE MICHIGAN, WISCONSIN, ILLIONOIS, INDIANA, AND MICHIGAN.
National Field Investigations Center-Denver, Colo.

Available from NTIS, Springfield, Va 22151 as PB-214 503 Price $3.00 printed copy; $1.45 microfiche. Office of Enforcement Publication, September 1972. 36 p, 19 fig.

Descriptors: *Thermal pollution, *Electric powerplants, *Lake Michigan, *Remote sensing, Aerial photography, Data collections, Water temperature, Heated water, Water pollution sources, *Path of pollutants, Legal aspects.

An areal reconnaissance was conducted along segments of the shoreline of Lake Michigan on September 14, 1972, to document the extent of thermal discharges from the major electric powerplants over the area extending from Muskegon, Michigan, to Twin Creeks, Wisconsin. Ten power stations were in operation at the time of flight, and three plants were not in operation. Nine of the 10 plants in operation were violating the recommended 3 deg F maximum temperature increase at the distance of 1,000 feet from the outfall. In addition, six of the power plants were also violating this permitted 3 deg F increase even at a distance of 2,000 feet from the plant discharge. None of the discharges caused the surface temperature of the receiving water, at the 1,000-ft point, to exceed the maximum allowable surface temperature limit for September of 80 deg F. The data indicate that the recommendations of the Lake Michigan Enforcement Conference are not being met by many thermal and industrial discharge sources. (Woodard-USGS)
W73-12309

STATE UNIVERSITY OF NEW YORK, COLLEGE AT PLATTSBURGH, LAKES AND RIVERS RESEARCH LABORATORY 1972 TECHNICAL REPORT.
February 1973. 205 p.

Descriptors: *Limnology, *Lakes, *New York, Ecology, Lead, Nitrates, Phosphates, Mathematical models, Hypsometric analysis, Bibliographies, Organic matter, Nutrients, *Path of pollutants.
Identifiers: *Lake Champlain.

The Lakes and Rivers Research Laboratory of the State University of New York, College at Plattsburgh serves multiple needs. Operating as part of the Faculty of Science and Mathematics it helps to furnish the faculty members at Plattsburgh interested in limnology with much of the needed equipment and supplies for their research endeavors. A laboratory of about 1200 square feet is utilized by faculty and students engaged in lake related research. The papers presented are a sample of the variety of projects that the Lakes and Rivers Research Laboratory has been engaged in over the past year. The topics discussed are toxicity of lead nitrate to algae; seasonal and spatial distribution of phosphates, nitrates, and silicates in Lake Champlain; orthophosphate concentrations and distributions in Northwest Bay; aquatic modeling; a general model for vertical thermal stratification in ice free lakes; hypsometry of Lower Chateaugay Lake, a Pond on the Saranac River, and Harris Lake; and dissolved organic matter in natural waters, a bibliography. (See W73-12322 thru W73-12329) (Knapp-USGS)
W73-12321

TOXICITY OF LEAD NITRATE TO FIVE SPECIES OF FRESHWATER ALGAE,
State Univ. Coll., Plattsburgh, N.Y. Miner Inst. of Man and His Environment.
For primary bibliographic entry see Field 05C.
W73-12322

STUDIES ON THE SEASONAL AND SPATIAL DISTRIBUTION OF PHOSPHATES, NITRATES, AND SILICATES IN LAKE CHAMPLAIN,
State Univ. Coll., Plattsburgh, N.Y. Dept. of Biological Sciences.
G. K. Greundling, and J. L. Malanchuk.
In: State University of New York Lakes and Rivers Research Laboratory 1972, Technical Report, p 25-50, February 1973. 7 fig, 1 tab, 13 ref, 3 append.

Descriptors: *Nutrients, *Lakes, *New York, Data collections, Limnology, Phosphates, Silica, Nitrates.
Identifiers: *Lake Champlain.

Major nutrient concentrations were measured during 1970 in Lake Champlain, New York. Nitrates in the northeast arm stations are significantly different throughout the year from the open lake and bays stations in the western portion of the lake. Seasonal trends of high concentrations of soluble nitrate in the spring, winter, and fall, and low concentrations in the summer, probably reflect various stages of runoff, turnover, and phytoplankton uptake. The general trend of silica for the lake is that concentrations are high during the spring and then drop off rapidly during and immediately after the spring diatom bloom. Silicate concentrations are generally higher at the western bay and western open stations during the winter and early spring, but then drop off to values lower than the northeast arm during the summer and fall. The high values in the spring can probably be explained by the fact that the bay stations receive large amounts of runoff from the nearby land and river systems. The rapid decrease in values during late spring and summer are probably due to dilution of inputs by mixing and the uptake of silicon by diatoms. There are very few times that any detectable soluble phosphate was measured in any areas of the lake. Most of it is taken up by planktonic organisms. There is much less difference between stations than concentrations of other major nutrients measured. (See also W73-12321) (Knapp-USGS)
W73-12323

ORTHOPHOSPHATE CONCENTRATIONS AND DISTRIBUTIONS IN NORTHWEST BAY: 1971--1972,
R. J. Bobka.
In: State University of New York Lakes and Rivers Research Laboratory 1972, Technical Report, p 51-55, February 1973. 1 fig, 6 ref.

Descriptors: *Phosphates, *Lakes, *New York, Sewage treatment, Eutrophication, Limnology, Nutrients, Outfall sewers, Path of pollutants, Treatment facilities.
Identifiers: *Westport (NY), *Lake Champlain.

In 1971 the Village of Westport, New York, began to operate a secondary sewage treatment plant. Prior to 1971 the village had no central sewage treatment facility and waste water reached Northwest Bay, Lake Champlain, by natural routes. The situation at Westport afforded a convenient opportunity to observe phosphate concentration and distribution over a period of years following the beginning of operation of a new sewage treatment plant. The average bottom-surface phosphate concentrations in Northwest Bay are generally high, about 150 ugm/liter, especially at the inshore areas. Farther out in Lake Champlain, phosphate concentrations are 40-60 ugm/liter. The average phosphate concentration in the vicinity of the outfall is in excess of 200 ugm/liter. (See also W73-12321) (Knapp-USGS)
W73-12324

MODULES FOR INTEGRATED AQUATIC MODELING,
W. A. Gavryck, and M. Katzper.
In: State University of New York Lakes and Rivers Laboratory 1972, Technical Report, p 56-80, February 1973. 6 fig, 6 ref, 2 append.

Descriptors: *Mathematical models, *Ecosystems, *Limnology, Ecology, Simulation analysis, Lakes, Systems analysis, Computer programs.
Identifiers: *Lake Champlain.

An approach to aquatic modeling and simulation incorporates physical, biological, and chemical factors, all modeled and developed in modular form. Each module can be studied and tested individually and subsequently combined with others, resulting in an overall simulation model of the entire system. The modules allow for the study of individual biological components as functions of many physical and chemical controlling factors. When the individual constituents are combined some of these physical and chemical factors become interaction factors of the combined units and form part of the internal self-regulation of the system. (See also W73-12321) (Knapp-USGS)
W73-12325

A GENERAL MODEL FOR VERTICAL THERMAL STRATIFICATION IN ICE FREE LAKES,
State Univ. Coll., Plattsburgh, N.Y.
For primary bibliographic entry see Field 02H.
W73-12326

HYPSOMETRY OF LOWER CHATEAUGAY LAKE AND A POND ON THE SARANAC RIVER,
For primary bibliographic entry see Field 02H.
W73-12327

HYPSOMETRIC MAP OF HARRIS LAKE, NEW YORK,
State Univ. Coll., Plattsburgh, N.Y.
For primary bibliographic entry see Field 02H.
W73-12328

DISSOLVED ORGANIC MATTER IN NATURAL WATERS: A SELECTED BIBLIOGRAPHY, WITH EMPHASIS ON ANALYTICAL METHODS,
State Univ. Coll., Plattsburgh, N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 02H.
W73-12329

A PEDOCHEMICAL SURVEY: I. LITHIUM,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Soil Bureau.
For primary bibliographic entry see Field 02K.
W73-12331

WIND DISSEMINATION OF WATERBORNE ERWINIA AMYLOVORA FROM PYRUS TO PYRACANTHA AND COTONEASTER,
Iowa State Univ., Ames. Dept. of Horticulture.
For primary bibliographic entry see Field 03F.
W73-12338

5C. Effects of Pollution

DISTRIBUTION OF MERCURY, CADMIUM, LEAD AND THALLIUM IN A EUTROPHIC LAKE,
Bradley Univ., Peoria, Ill. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W73-11707

FEEDLOT WASTE UTILIZED EFFICIENTLY BY ANIMALS.
Oklahoma State Univ., Stillwater.
For primary bibliographic entry see Field 05B.
W73-11762

WHY NITRATES IN WATER SUPPLIES,
For primary bibliographic entry see Field 05B.
W73-11765

IMPROVED BEEF CONFINEMENT FACILITIES THROUGH PIT VENTILATION AND TEMPERED AIR INTAKES,
Northern States Power Co., Minneapolis, Minn.
M. Nabben.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No. 72-449, 7 p.

Descriptors: *Ventilation, *Farm wastes, *Viruses, Animal diseases, Cattle.
Identifiers: Fogging, Velometer test.

The high incidence of virus pneumonia in animals with cough problems in a feeder beef cattle herd prompted the owner and veterinarian to seek the cause and solution. They believed that the ventilation system (which is described in detail) was the main factor causing illness. The air flow patterns in the building were rearranged; exhaust fans were installed to remove gases created in the liquid manure pit; and electric heaters were installed in every fresh air intake to eliminate fogging. Before these changes were made, there was a 10% death loss of cattle and frequent visits were made by the veterinarian. After the changes were made (during the 1971-72 winter), there were no deaths nor veterinarian trips. (Dudley-East Central)
W73-11775

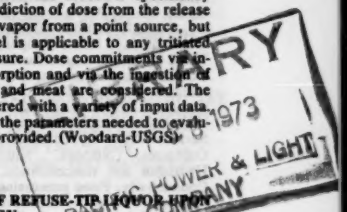
WASTE-CAUSED AIR POLLUTANTS ARE MEASURED IN SWINE BUILDINGS,
Illinois Univ., Urbana. Agricultural Experiment Station.
For primary bibliographic entry see Field 05A.
W73-11778

OIL AND ICE IN THE ARCTIC OCEAN: POSSIBLE LARGE-SCALE INTERACTIONS,
Geological Survey, Tacoma, Wash. Ice Dynamics Project.
For primary bibliographic entry see Field 05B.
W73-11839

THE DOSE TO MAN VIA FOOD-CHAIN TRANSFER RESULTING FROM EXPOSURE TO TRITIATED WATER VAPOR,
California Univ., Livermore. Lawrence Livermore Lab.
L. R. Anspaugh, J. J. Koranda, W. L. Robison, and J. R. Martin.
Available from NTIS, Springfield, Va 22151 as CONF-710809-19, Price $3.00 printed copy, $1.45 microfiche. Preprint UCRL-73195 Rev 1, July 13, 1972. 27 p, 4 fig, 4 tab, 39 ref.

Descriptors: *Pollutants, *Tritium, *Water vapor, Ecosystems, Food chains, Forecasting, Model studies, Radioactive wastes.
Identifiers: Human consumption (Tritium).

A model is described that predicts doses to man resulting from food-chain contamination due to exposure to tritiated water vapor. It incorporated knowledge concerning the environmental behavior of tritiated water which was obtained during radioecology studies. The model is specifically directed to the prediction of dose from the release of tritiated water vapor from a point source, but most of the model is applicable to any tritiated water vapor exposure. Dose commitments via inhalation plus absorption and via the ingestion of vegetables, milk, and meat are considered. The model may be entered with a variety of input data. Average values of the parameters needed to evaluate the model are provided. (Woodard-USGS)
W73-11851



THE EFFECTS OF REFUSE-TIP LIQUOR UPON STREAM BIOLOGY,
P. M. Nuttall.
Environmental Pollution, Vol 4, No 3, p 215-222, April 1973. 1 fig, 2 tab, 15 ref.

Descriptors: *Water pollution effects, *Fungi, *Oligochaetes, *Diptera, *Crustaceans, *Stoneflies, *Mayflies, *Caddisflies, *Water beetles, *Mollusks, Dominant organisms, Industrial wastes, Nutrients, Streams, Nitrates, Nitrites, Calcium, Magnesium, Iron, Phosphates, Benthic fauna, Sampling, Toxicity.
Identifiers: *Refuse-tip liquor, *Turbellaria, *Hirudinea, Macroinvertebrates, Sewage fungi, Chironomids, Midges, Leeches, Beetles, Scuds, Skimmers, Black flies, Phagocata vitta, Polycelis spp., Nais spp., Branchiura sowerbyi, Rhyacodrilus coccineus, Tubifex spp., Lumbriculus variegata, Stylodrilus heringianus, Enchytraeidae, Eiseniella tetrahedra, Helobdella stagnalis, Glossiphonia complanata, Gammarus pulex, Amphinemura spp., Isoperla grammatica, Brachyptera risi, Chloroperla torrentium, Leuctra hippopus, Nemurella picteti, Nemoura cinerea, Perlodes microcephala, Protonemoura meyeri, Rhabdiopteryx acuminata, Baetis rhodani, Ecdyonurus dispar, Ephemerella notata, Paraleptophlebia submarginata, Rhithrogena semicolorata, Hydropsyche instabilis, Limnephilidae, Polycentropus kingi, Rhyacophila dorsalis, Sericostoma personatum, Silo nigricornis, Elmis aenea, Gyrinus, Limnius volckmari.

An assessment was made of the effects of drainage from five refuse-tips upon the biology of the receiving watercourses. Refuse-tip liquor is a complex suspension and solution of organic and inorganic constituents, with an acid pH, high conductivity and usually high concentration of iron in solution. Phosphate content is high and nitrogen, as free and saline ammonia, is usually high. Refuse-tip liquor tends to have a high BOD and causes severe de-oxygenation of the river at the point of discharge. Three refuse-tips were found to be the cause of gross pollution of the stream, resulting in massive growths of sewage fungus Leptomitus lacteus, with the invertebrate community dominated by the oligochaete Nais elinguis over a considerable distance downstream. Chironomidae and the oligochaetes Tubifex ignotus, Tubifex tubifex and Lumbriculus

variegata were frequent immediately below discharges. The absence of many invertebrate species appears to be associated with the presence of massive growths of sewage fungus in the stream trapping silt and blocking the interstices between stones, and the increase in pollution. (Little-Battelle)
W73-11859

ABUNDANCE AND DIVERSITY OF MOLLUSCA IN AN INDUSTRIALIZED PORTION OF THE OTTAWA RIVER NEAR OTTAWA-HULL, CANADA,
Ottawa Univ. (Ontario). Dept. of Biology.
G. L. Mackie, and S. U. Qadri.
Journal of the Fisheries Research Board of Canada, Vol 30, No 2, p 167-172, February 1973. 1 fig, 3 tab, 14 ref.

Descriptors: *Water pollution effects, *Ecological distribution, *Spatial distribution, *Gastropods, *Industrial wastes, *Standing crops, Mollusks, Snails, Clams, Pulp wastes, Pulp and paper industry, Outlets, Bottom sampling, Aquatic plants, Water quality, Water sampling, Organic wastes, Wood wastes, Sewage effluents, Water chemistry, Downstream, Upstream, Benthic fauna, Invertebrates, Aquatic animals, Biochemical oxygen demand, Water analysis, Water properties, Chemical analysis, Velocity, Dissolved oxygen, Surface water, Hypolimnion, Hardness (Water), Coliforms, Nitrates, Nitrites, Phosphates, Hydrogen ion concentration, Carbon dioxide, Conductivity, Food processing industry, Aquatic weeds, Pondweeds, Effluents, Pollutants, Alkalinity, Calcium, Phenols, Sulfates, Turbidity.
Identifiers: *Ottawa River, *Pelecypods, *Species diversity, *Species density, Slaughterhouse wastes, Macroinvertebrates, Goniobasis livescens, Helisoma spp., Pomatiopsis lapidaria, Lymnaea catascopium, Amnicola spp., Probythinella lacustris, Valvata spp., Gyraulus spp., Promenetus exacuous, Physa gyrina, Ferrissia parallela, Campeloma decisum, Bithynia tentaculata, Sphaerium spp., Pisidium spp., Elliptio complanatus, Lampsilis radiata, Fecal coliforms, Orthophosphates, Britannia Bay, Macrophytes, Potamogeton spp, Elodea canadensis, Wild celery, Vallisneria americana, Myriophyllum heterophyllum, Myriophyllum heterophyllum, Myriophyllum alterniflora, Water weeds, Water milfoil, Brewery Creek, Kettle Island, Pouch snails, Pond snails, Orb snails, Ekman grab.

The abundance and diversity of Gastropoda and Pelecypoda were compared during May-November 1968 in portions of the Ottawa River near Ottawa-Hull immediately upstream and downstream of outfalls from a slaughter house and two pulp and paper mills. Weekly determinations were made on both bottom and surface waters at 5 sites of velocity, dissolved oxygen and carbon dioxide, pH, and conductivity. Every 2 weeks bottom and surface waters were analyzed for 15 parameters, including BOD, orthophosphate, nitrate, nitrite, calcium hardness, total coliform and total fecal coliform bacteria. Gastropods and pelecypods were sampled using a random sampling technique and the Ekman grab. Percentage estimates of organic matter in the sediments were made by ashing after removal of all animals and weighing 3 samples from each station. Organic pollution was a major factor in limiting the abundance and diversity of Gastropoda and Pelecypoda in the Ottawa River near Ottawa-Hull. Analyses of the 472 Ekman grab samples showed that the average standing crop (no./sq m) of mollusks was larger in areas immediately upstream than in areas immediately downstream of slaughter house and pulp and paper mill outfalls. (Holoman-Battelle)
W73-11862

NESTING BASS OBSERVED WITH UNDERWATER TELEVISION,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 05A.
W73-11864

PREPARING TELEOST EMBRYOS FOR STUDY,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 05A.
W73-11865

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF MAINE YANKEE ATOMIC POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket No 50309-61. $7.60 per copy, $1.45 microfiche. Docket No 50309-61, July 1972. 229 p, 13 fig, 24 tab, 58 ref, 1 append.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Maine.
Identifiers: *Pressurized water reactors, *Montsweag Bay, *Sheepscot River Estuary, Environmental impact statements.

This final environmental statement relates to the issuance of an operating license for the Maine Yankee Atomic Power Station. This station is located near Wiscasset in Lincoln County, Maine, and will employ a pressurized water reactor with a once-through cooling system receiving water from and discharging into Montsweag Bay, a part of the Sheepscot River Estuary. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion was to issue an operating license for the facility subject to the following conditions: (1) Remove Cowseagan Causeway and replace with an appropriate bridge. (2) Monitor water temperatures outside Bailey Cove. (3) Enact operational monitoring program to assess long-term effect on biota. (4) If adverse effects occur, corrective action is required. (Houser-ORNL)
W73-11899

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF ZION NUCLEAR POWER STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50295-74, $10.60 per copy, $1.45 microfiche. Docket No 50295-74, Dec 1972. 335 p, 19 fig, 32 tab, 177 ref, 17 append.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Lake Michigan, Illinois.
Identifiers: *Pressurized water reactors, Environmental impact statements.

This final environmental statement relates to the proposed construction and operation of the Zion Nuclear Power Station. The power plant is located in Zion, Illinois, and will consist of two units, each using a pressurized-water reactor and cooled by a once-through system discharged to Lake Michigan. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permits and issue an operating license subject to the following conditions: (1) Perform certain radiological and nonradiological monitoring programs concerned with the thermal plume and deicing operations. (2) Develop design modifications to the condenser cooling-water intake structure and install if needed to minimize the fish kill. (3) Provide an analysis and course of action to alleviate detrimental effects or damage found as a result of plant operation. (Houser-ORNL)
W73-11900

APPLICATIONS OF A DERIVED FORMULA FOR THE DISCHARGE OF RADIOACTIVE LIQUID WASTES,
Comitato Nazionale per l'Energia Nucleare, Rome (Italy).
G. Branca, F. Breuer, A. A. Cigna, and R. Amavis.
Available from NTIS, Springfield, Va., as EUR-4897e; $4.00 in paper copy, $1.45 in microfiche. Report EUR 4897e, 1973. 35 p, 7 tab, 17 ref.

Descriptors: *Food chains, *Nuclear wastes, *Path of pollutants, *Mathematical models, Radioisotopes, Absorption, Freshwater fish, Effluents, Rivers, Lakes, Potable water, Strontium radioisotopes, Cobalt radioisotopes, Tritium, Milk.
Identifiers: Cerium radioisotopes, Ruthenium radioisotopes, Iron radioisotopes, Manganese radioisotopes, Plutonium.

Discharge limits (in Curies/year) to a typical aquatic receiving environment for radioisotopes from nuclear power stations are calculated for exposure pathway via consumption of lake fish (Sr90, 0.68; Cs137, 5; Ru106, 370; and Co60, 128) and drinking water (Ru106, 90; others higher than for fish consumption). Concentration factors for radioisotope uptake by fish for these and other elements (tritium, Ce, Pu, Mn, Fe, Co), and discharge limits for other aquatic receiving environments are tabulated. For atmospheric discharge of I131 to the environment considered, the rainout-fodder-milk-infant pathway set a discharge limit of 30 Curies/year. (See also W72-12198) (Bopp-ORNL)
W73-11901

NATIONAL ACCELERATOR LABORATORY, BATAVIA, ILLINOIS. (ENVIRONMENTAL STATEMENT).
Atomic Energy Commission, Washington, D.C.

Available from NTIS, Springfield, Va., as Report WASH-1505. $5.45 per copy, $1.45 microfiche. Report No. WASH-1505, Dec 1971. 56 p, 9 fig, 10 ref, 4 append.

Descriptors: Nuclear physics, *Atomic plants, *Water pollution, *Water pollution sources, *Water cooling, *Thermal pollution, Nuclear wastes, Radioactive wastes, Ecology, Sites, Environment, Reservoir storage, Retention, Regulation, Natural resource, Public health.
Identifiers: *Accelerator, High energy physics, Environmental Impact Statements.

This environmental statement relates to the proposed construction and operation of a National Accelerator Laboratory (NAL) at Batavia, Illinois. The cooling system will be a combination of evaporative cooling and air cooling. The water

source will be run-off water collected in a catch basin and from shallow wells with the Fox River and a deep well as a backup system. Heated water will be returned to the retention pond. Environmental impacts are assessed, alternatives considered, and a benefit-cost summary compiled. After weighing the benefits of this proposed course of action against the environmental cost of implementing it, and considering the available alternatives, it is concluded that the AEC should proceed to completion of design and construction of NAL and to subsequent operations at the planned energy levels. (Houser-ORNL)
W73-11902

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SURRY POWER STATION UNIT 2.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50281-73. $7.60 per copy, $1.45 microfiche. Docket 50281-73, June 1972. 290 p, 39 fig, 32 tab, 174 ref, 10 append.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Virginia, James River.
Identifiers: *Pressurized water reactors, Environmental Impact Statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed issuance of operating license for the Surry Power Station Unit 2 and considers the environmental impact of Units 1 and 2. This station is located in Surry County, Virginia, and will be cooled by water from and returned to the James River. Each unit will employ a pressurized water reactor. Environmental impacts were assessed, and, after consideration of alternatives, an environmental benefit-cost summary was compiled. Environmental factors considered include hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permit and issue an operating license for Unit No. 2 subject to the following conditions: (1) perform both radiological and non-radiological programs for a minimum of three years to determine impact of operations, (2) monitor the number and species of fish kills attributed to operation of the station. (Houser-ORNL)
W73-11903

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF KEWAUNEE NUCLEAR POWER PLANT.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50305-61, $10.60 per copy, $1.45 microfiche. Docket 50305-61, December 1972. 354 p, 29 fig, 54 tab, 167 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Wisconsin.
Identifiers: *Pressurized-water reactors, Carlton Township (Wis), Environmental Impact Statements.

This final environmental statement relates to the proposed continuation of construction and operation of the Kewaunee Nuclear Power Plant. The plant is located in Carlton, Wisconsin, and will use a pressurized-water reactor cooled by once-through cooling water from Lake Michigan. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permit and issue an operating license for the facility subject to the following conditions: (1) Monitor for biotic effects of plant discharge plume. (2) Monitor fish movement, plankton displacement, and toxicological aspects of discharge water to fish. (3) Evaluate thermal pollution effects. (4) Monitor the hydrological conditions under various circumstances. (5) Monitor residual chlorine concentrations. (6) Radiologically monitor the plant environs. (7) Monitor erosion of shoreline. (8) Provide a plan of action to eliminate or reduce any harmful effects found. (Houser-ORNL)
W73-11904

REPORT ON RELEASES OF RADIOACTIVITY IN EFFLUENTS FROM NUCLEAR POWER PLANTS FOR 1971.
Directorate of Regulatory Operations (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-11905

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF FORT CALHOUN STATION UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket No. 50285-71. $7.60 per copy, $1.45 microfiche. Docket 50285-71, Aug 1972. 272 p, 11 fig, 28 tab, 73 ref, 4 append.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Nebraska, Missouri River.
Identifiers: *Pressurized water reactors, Environmental Impact Statements.

This final environmental statement relates to the proposed continuation of construction and issuance of an operating license for the Fort Calhoun Station Unit No. 1. The plant is located on the Missouri River near Blair, Washington County, Nebraska, and will employ a pressurized-water reactor cooled by once-through flow of water obtained from and discharged to the Missouri River. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion was to continue the construction permit and to issue an operating license for the facility subject to the following conditions: (1) continue nonradiological monitoring program for assessment of effects on the aquatic environment; (2) monitor the number and species of fish killed due to operation of the station; (3) carry out a radiological monitoring program to determine any radiological effects due to operation of the station; (4) provide an analysis and a course of action to alleviate any harmful effects. (Houser-ORNL)
W73-11906

MODELING IN THE EASTERN DECIDUOUS FOREST BIOME.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 02E.
W73-11907

ENVIRONMENTAL MONITORING REPORT FOR SANDIA LABORATORIES FROM 1964 THROUGH 1972.
Sandia Labs., Albuquerque, N. Mex.
For primary bibliographic entry see Field 05A.
W73-11908

ENVIRONMENTAL MONITORING IN THE VICINITY OF THE LOS ALAMOS SCIENTIFIC LABORATORY - CALENDAR YEAR 1972.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 05A.
W73-11909

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE ARKANSAS NUCLEAR ONE UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50313-64; $10.60 per copy, $1.45 microfiche. Docket No. 50313-64, Feb 1973. 369 p, 46 fig, 43 tab, 181 ref, 6 append.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Arkansas.
Identifiers: *Pressurized water reactors, Environmental Impact Statements.

This final environmental statement relates to the proposed issuance of an operating license for the Arkansas Nuclear One Unit 1 power plant. This plant is located on a peninsula on the northern shores of Lake Dardanelle, an impoundment of the Arkansas River system. The site is in Arkansas, County of Pope. Unit 1 of this plant will employ a pressurized-water reactor cooled by a once-through type of cooling system. Unit 2 will have the same type of reactor, cooled by natural-draft cooling tower. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue an operating license for the facility subject to the following conditions: Perform monitoring programs of Lake Dardanelle to determine aquatic-biological impact, fish killed on intake screens, thermal monitoring of plume, control radioactivity releases, and residual chlorine in discharge. These monitoring programs will be defined by the applicant and included in the technical specifications. An analysis of and a

course of action to alleviate any impact problem is required. (HouseriORNL)
W73-11913

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED HANFORD NUMBER TWO NUCLEAR POWER PLANT.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50397-33; $7.60 per copy, $1.45 microfiche. Docket 50397-33, December 1972. 281 p, 24 fig, 31 tab, 172 ref, 3 append.

Descriptors: *Columbia River, *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Washington.
Identifiers: *Environmental Impact Statements, *Boiling-water reactors.

This final environmental statement relates to the proposed construction of the Hanford No. Two Nuclear Power Plant. This plant is located in the state of Washington, County of Benton, near the city of Richland, and will employ a single-cycle forced-circulation, boiling-water reactor cooled by an evaporative, forced-draft cooling tower system. Makeup water and blowdown from the cooling towers will be taken from and discharged to the Columbia River. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. It is concluded to issue a construction permit for the facility subject to the following conditions: (1) Construct a meteorology tower to provide data for assessing adverse environmental effects. (2) Immobilize chemicals discharged to the soil. (3) Incorporate three additional radiological monitoring stations into the system to discriminate between releases from the plant and other sources. (Houser-ORNL)
W73-11917

THE POTENTIAL RADIOLOGICAL IMPLICATIONS OF NUCLEAR FACILITIES IN THE UPPER MISSISSIPPI RIVER BASIN IN THE YEAR 2000.
Division of Reactor Development and Technology (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-11918

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF DAVIS-BESSE NUCLEAR POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50346-41, $7.60 per copy, $1.45 microfiche. Docket 50346-41, March 1973. 287 p, 25 fig, 42 tab, 128 ref, 13 append.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Ohio, Lake Erie, Thermal pollution, Tritium.
Identifiers: *Environmental Impact Statements, *Pressurized water reactors.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed continuation of construction permit of the Davis-Besse Nuclear Power Station, Ottawa Co., Ohio; a pressurized water reactor cooled by water through a single hyperbolic natural-draft cooling tower. Makeup water will come from Lake Erie. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. It is concluded to continue the construction permit, subject to certain specified monitoring programs and design criteria for residual chlorine concentration. (Houser-ORNL)
W73-11920

RADIOLOGICAL STATUS OF THE GROUNDWATER BENEATH THE HANFORD PROJECT - JULY-DECEMBER, 1971,
Battelle-Pacific Northwest Labs. Richland, Wash.
For primary bibliographic entry see Field 05A.
W73-11923

ENVIRONMENTAL SURVEILLANCE AT HANFORD FOR CY-1972,
Battelle-Pacific Northwest Labs. Richland, Wash.
For primary bibliographic entry see Field 05A.
W73-11924

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF SHEARON HARRIS NUCLEAR POWER PLANT UNITS 1, 2, 3, AND 4.
Directorate of Licensing, (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50400-43; $10.60 per copy, $1.45 microfiche. Docket 50400-43, 338 p, 20 fig, 41 tab, 170 ref. (1973).

Descriptors: *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis.
Identifiers: Atomic Energy Commission, Environmental impact statements, *Pressurized water reactors.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed construction of four pressurized water reactors of the Shearon Harris Nuclear Power Plant. This plant is located near Raleigh, N. C. The exhaust steam will be cooled by closed-cycle recirculation of water obtained from and discharged to an 8375-acre cooling lake. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and groundwater), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. It is concluded to issue construction permits subject to the following conditions: (1) Submit design for intake structure from the Cape Fear River. (2) Proper disposal of morpholine or use of acceptable chemical. (3) Establish an ecological base line for measuring operational impact, and initiate program 2 yr prior to operation. (4) Collect one full year of meteorological data. (5) Maintain stipulated chlorine concentration levels. (Houser-ORNL)
W73-11926

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CRYSTAL RIVER UNIT 3.
Atomic Energy Commission, Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50302-75, $10.60 per copy, $1.45 microfiche. Docket 50302-75, May 1973. 403 p, 45 fig, 44 tab, 129 ref, 5 append.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Florida.
Identifiers: Environmental impact statements, *Pressurized water reactors, Crystal River (Fla).

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed continuation of construction and issuance of an operating license for the Crystal River Unit No. 3. The site is on the Gulf of Mexico near Crystal River, Florida. It will employ a pressurized water reactor cooled by once-through water obtained from and discharged to the Gulf of Mexico. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and groundwater), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion was to continue the construction permit and issue an operating license for the facility subject to the following conditions: (1) further study to reduce or eliminate impact of entrainment and discharge of heated water to the Gulf of Mexico; (2) further study of the cooling system, (3) definition of a monitoring program for operational impacts; (4) submittal of an analysis of operational problems and proposal of a course of action to alleviate the problem. (Houser-ORNL)
W73-11927

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF PILGRIM NUCLEAR POWER STATION.
Division of Radiological and Environmental Protection (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50293-70; $7.60 per copy, $1.45 microfiche. Docket 50293-70, May 1972. 182 p, 16 fig, 12 tab, 62 ref, 3 append.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Massachusetts, Lobsters, Mosses.
Identifiers: Environmental impact statement, *Boiling water reactors, *Cape Cod Bay (Mass).

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the operation of the Pil-

grim Nuclear Power Station, a boiling water reactor cooled by a once-through flow of salt water from Cape Cod Bay, Plymouth, Mass. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and groundwater), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. It is concluded that an operating license be issued subject to continuation of the environmental monitoring program for at least a five-year period after the station begins operation, and mitigation of any adverse effects found. (Houser-ORNL)
W73-11928

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF JOSEPH M. FARLEY NUCLEAR PLANT UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket No 50348-50; $7.60 per copy, $1.45 microfiche. Dockets 50348-50 and 50364-42, June 1972. 255 p, 38 fig, 24 tab, 120 ref, 6 append.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, *Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Meteology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Alabama.
Identifiers: Environmental impact statements, *Pressurized water reactors, Chattahoochee River.

This final environmental statement relates to the proposed construction of the Joseph M. Farley Nuclear Plant Units 1 and 2. The plant is located in Southeastern Alabama on the Chattahoochee River, east of Dothan, Alabama. The plant will employ two pressurized water reactors with a closed-cycle cooling system using mechanical-draft cooling towers. Make-up water will be taken from and discharged to the Chatahoochee River. Environmental impacts were accessed, and, after consideration of alternatives, an environmental benefit-cost summary was compiled. Some environmental factors considered include hydrology (surface water and groundwater), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent air and water. The conclusion was to issue a construction permit for the facility subject to the following conditions: (1) define an acceptable environmental monitoring program to determine changes in the ecosystem due to plant operations; (2) collect weather data sufficient to determine fogging conditions; (3) obtain information to determine noise level of operations at the site boundary along highway 95; (4) install gauging equipment in the Chattahoochee River to record flow conditions and study impact of entrainment. (Houser-ORNL)
W73-11931

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF VERMONT YANKEE NUCLEAR POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket No 50271-88; $10.60 per copy, $1.45 microfiche. Docket 50271-88, July 1972. 348 p, 33 fig, 33 tab, 139 ref, 5 append.

Descriptors: *Nuclear powerplants, *Effluents, *Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Vermont, Connecticut River.
Identifiers: Environmental impact statements, *Boiling water reactors.

This final environmental statement relates to the issuance of an operating license for the Vermont Yankee Nuclear Power Corporation. The plant will use a single-unit boiling water reactor and is located on the Connecticut River near Vernon, Vermont. It will be cooled by a once-through flow of water pumped from and returned to Vernon Pond and also by means of mechanical draft cooling towers. Environmental impacts were assessed, and, after consideration of alternatives, an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion was to issue an operating license subject to the following conditions: (1) Restrict temperature rise in Vernon Pond for ecological concern. (2) Restrict total residual chlorine in the plant discharge. (3) Define an acceptable environmental monitoring program to determine changes in the ecosystems resulting from plant operations. (4) Provide an analysis and course of action for alleviating any harmful effects found as a result of the plant operations. (Houser-ORNL)
W73-11932

THE KINETICS OF SIMULTANEOUS GLUCOSE AND XYLOSE UTILIZATION BY RHODOTORULA RUBRA,
Alaska Univ., College. Inst. of Marine Science.
B. Robertson, D. F. Holleman, and D. K. Button.
In: Multiple Substrate Transport in Dilute Solution, D. K. Button, Ed. 1971, University of Alaska, Institute of Marine Science, Fairbanks. p 49-65. OWRR A-023-ALAS (2).

Descriptors: *Biochemistry, *Kinetics, *Carbohydrates, *Growth rates, *Absorption, Yeasts, Marine fungi, Plant growth, Metabolism, Nutrients.
Identifiers: *Glucose, *Xylose, Rhodotorula rubra.

Organisms growing heterotrophically in natural water systems are faced with a large array of particulate and dissolved carbon sources from which they must select a group that can be transported and metabolized. Transport capabilities of many organisms for carbon sources appear to be saturated at fluxes less than required for even moderate growth rates and single components range far below their Michaelis constants for growth; thus it appears that multiple simultaneous substrate incorporation is the rule for dilute carbon source accumulation. Concentrations of glucose and xylose are described during the carbohydrate limited steady state growth of the marine yeast Rhodotorula rubra when present both separately and simultaneously over a range of growth rates. Minimum substrate levels must be exceeded before reproduction can occur. The time course of continuous cultures containing both glucose and xylose over a range of growth rates is shown. Maximum growth rate on glucose is increased by the addition of xylose but steady state glucose is only slightly affected. These new high growth rates are characterized by increased substrate affinity. The addition of glucose reduces limiting xylose concentrations to about half the steady state values of xylose alone. (Jones-Wisconsin)
W73-11934

CHEMOSTASIS AND HOMEOSTASIS IN AQUATIC ECOSYSTEMS: PRINCIPLES OF WATER POLLUTION CONTROL,
Harvard Univ., Cambridge, Mass. Labs. of Applied Chemistry and Applied Biology.
W. Stumm, and E. Stumm-Zollinger.
In: Nonequilibrium Systems in Natural Water Chemistry, Symposium of the American Chemical Society, Division of Water, Air, and Waste Chemistry, February 24-25, 1970, Houston, Texas, p 1-29. 10 fig, 2 tab, 42 ref.

Descriptors: *Balance of nature, *Ecosystems, *Water pollution control, Energy, Waste treatment, Modeling, Water chemistry, Equilibrium, Photosynthesis, Respiration, Succession, Human population, Water quality, Eutrophication.
Identifiers: *Chemostasis, *Homeostasis, Ecosystem stability.

Pollution is equated with disturbance of ecological balance and loss of stability. The members of an ecosystem are interlocked by various feedback loops (homeostasis) and thus adapted to coexistence for mutual advantage; increased diversity makes the system less subject to perturbations and enhance its survival. Chemical and biological factors regulating the composition of natural waters are reviewed. Natural waters are systems open to their environment, and much of their chemistry depends on the kinetics of physical and chemical processes. If input is balanced by output, a steady state condition is attained and the system remains unchanged in time. Such a time-invariant condition of a chemical reaction system represents a convenient idealized model of a natural water system. Because various disturbances cause similar and predictable changes, water pollution control methods beyond waste treatment can be outlined. The stress imposed on the environment results primarily from the fact that Western civilization is dependent on high energy utilization, yet unlimited growth in energy dissipation is incompatible with maintenance of ecological stability. Ecological constraints demand alteration of human, social, and economic systems toward a stationary state in which resources and materials are recycled as much as possible. (Jones-Wisconsin)
W73-11935

A DYNAMIC MODEL OF THE PHYTOPLANKTON POPULATION IN THE SACRAMENTO--SAN JOAQUIN DELTA,
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Programs.
D. M. Di Toro, D. J. O'Connor, and R. V. Thomann.
In: Nonequilibrium Systems in Natural Water Chemistry, Symposium of the American Chemical Society, Division of Water, Air, and Waste Chemistry, February 24-25, 1970, Houston, Texas, p 131-180. 12 fig, 7 tab, 67 ref.

Descriptors: *Water quality control, *Mathematical models, *Phytoplankton, *Eutrophication, California, Aquatic populations, Growth rates, Equations, Mortality, Respiration, Grazing, Zooplankton.
Identifiers: *Phytoplankton population model, Sacramento-San Joaquin Delta, Phytoplankton population kinetics, Lotka-Volterra equations.

A quantitative model of phytoplankton population dynamics in natural waters is introduced. Within this problem context, the simplifications, assumptions, and generally the structure of the model is formulated. The attempt was made to make the equations representative of the biological mechanisms while still retaining a sufficient simplicity so that the result is tractable and useful. The principle of conservation of mass is the basis upon which the mathematical development is structured. The form of the growth and death rates as functions of environmental parameters and de-

pendent variables is an important element in the phytoplankton population model. The equations are compared with two years' data from the tidal portion of the San Joaquin River, California. The agreement achieved between the available data and the model calculations prompts further effort in this direction. The resulting equations are admittedly complex and require numerical methods for solution. The initial application of these equations to an actual problem area with specific eutrophication problems has been sufficiently successful to support its engineering use as a preliminary step in the assessment of a potential or actual eutrophication problem. (Jones-Wisconsin)
W73-11937

CORRELATED LIGHT AND ELECTRON MICROSCOPE STUDIES ON BROWN ALGAE. I. LOCALIZATION OF ALGINIC ACID AND SULPHATED POLYSACCHARIDES IN DICTYOTA,
Leeds Univ. (England). Dept. of Plant Sciences.
L. V. Evans, and M. S. Holligan.
New Phytologist, Vol 71, No 6, p 1161-1172, 1972. 5 plates, 66 ref.

Descriptors: *Analytical techniques, *Microscopy, *Electron microscopy, *Phaeophyta, Cytological studies, Plant morphology.
Identifiers: *Alginic acid, *Sulphated polysaccharides, *Dictyota dichotoma, Fucoidan, Histochemistry, Light microscopy.

With information from chemical analyses of materials produced by brown algae, together with electron microscopy and light microscopic procedures, it was found that the cell walls of vegetative thallus and of mature reproductive cells (tetrasporangia, tetraspores, antheridia and oogonia) are composed of three to four well-defined layers, mainly of alginic acid, sulphated polysaccharide or a mixture of these. Prior to their secreation the two types of polysaccharide can generally be detected in conspicuous, peripheral, intracellular cytoplasmic vesicles. Alginic acid is liberated from vesicles through the plasma membrane by reversed pinocytosis. There is almost certainly some cellulose present also, although since alginic acid and cellulose are not yet distinguishable, the exact location of the cellulose is not clear. The origin of the alginic acid and sulphated polysaccharides has not been established. It is probable that one or more of these substances originate from Golgi complexes in thenuclear area where highly distended Golgi cisternae are commonly encountered. These results are discussed relative to other work on brown algal polysaccharides and histo-chemistry. Formation of extra-cellular material by peripheral vesicles, abundant in epidermal and apical cells but present also in medullary cells, oogonia and tetrasporangia, is also reported. (Jones-Wisconsin)
W73-11939

SEAWEEDS AS MANURE III. FIELD MANURIAL TRIALS ON PENNISETUM TYPHOIDS S. H. (PEARL MILLET) AND ARACHIS HYPOGEA (GROUNDNUT),
Central Salt and Marine Chemicals Research Inst., Bhavnagar (India).
K. K. Bokil, V. C. Mehta, and D. S. Datar.
Botanica Marina, Vol 15, No 3, p 148-150, 1972. 3 tab, 12 ref.

Descriptors: *Crop response, *Marine plants, *Fertilizers, *Evaluation, rhodophyta, Cereal crops, Oilseed crops, Semiarid climates, Organic matter, Forages.
Identifiers: *Seaweed manure, India, Pearl millet, Groundnut.

Application of seaweed manure as an auxilliary source of organic matter to two major crops, pearl millet and groundnut, and the crop response--either yield or quality--was evaluated in a semi-arid region at Bhavnagar, India. In experiments on pearl millet, effect of nitrogen applied as ammonium sulphate, sea weed manures, and farmyard manure was studied. On groundnut, nitrogen, phosphoric acid, sea weed and farmyard manures were applied. Average yield of grains and fodder of pearl millet and their nitrogen and phosphoric acid content show that both these constituents are favorably influenced by use of seaweed manure as compared to the effect of ammonium sulphate alone. Although the use of seaweed manure does not have significant influence over pearl millet yield, quality of its grains and fodder is favorably influenced. In data on average yield of groundnut pods and dry matter along with their quality attributes, it is observed that variation in yield of pods as well as dry matter, due to treatment differences, is insignificant. It is concluded that seaweed manure improves the quality attributes of crops and in some cases increases yields by enhancing utilization of nutrient elements applied in inorganic form. (Jones-Wisconsin)
W73-11941

PLANKTON DIATOM SPECIES BIOMASSES AND THE QUALITY OF AMERICAN RIVERS AND THE GREAT LAKES,
Alabama Univ., University. Dept. of Biology.
L. G. Williams.
Ecology, Vol 53, No 6, p 1038-1050, 1972. 5 fig, 1 tab, 18 ref.

Descriptors: *Plankton, *Diatoms, *Biomass, Water quality, Rivers, Great Lakes, Water analysis, Dominant organisms, Seasonal, Eutrophication, Analytical techniques, Algae, Sampling, Ecological distribution, Bioassay.

Diversity and dominance of diatom species for both the spring and fall population pulses are given for 128 stations on the Great Lakes and several major U. S. rivers. Possible relationships of various physical, chemical, and biotic parameters of water quality are suggested for immediate application to water pollution assessment and pollution abatement. Principal diatom species and their environmental conditions of temperature, dissolved oxygen, pH, and hardness for two years are tabulated. They appear to be related more to the edaphic factors of the drainage area than to known pollution; the diatom community structure appears to be a valid indication of the water quality of the stations investigated. The procedure used was selected to identify diatoms to species and to determine the biomass of each species with special methods for sample processing, counting techniques, data coding and reporting, and preservation as reported earlier. Biomass measurements of the total phytoplankton per liter and the biomass of each species of diatoms in 5 microliters of diatom biomass per sample are presented, comprising 54 semimonthly samples per station for 27 months, from October 1960 to January 1963. (Jones-Wisconsin)
W73-11942

THE LIGHT THRESHOLD CONTROLLING THE VERTICAL MIGRATION OF CHAOBORUS PUNCTIPENNIS IN A GEORGIA IMPOUNDMENT,
Georgia Univ., Athens. Dept. of Zoology.
I. Chaston.
Ecology, Vol 50, No 5, p 916-920, 1969.

Descriptors: *Diptera, *Light, *Vertical migration, *Insects, Georgia, Sediments, Seasonal, Diurnal, Light intensity, Larvae, Lentic environment.
Identifiers: *Chaoborus punctipennis, Nocturnal migration.

In most lentic situations, Chaoborus larvae are benthic during day and migrate into the water column at night. The light level at which the nocturnal migration of a lentic larva commences was measured by examining the light threshold for migration of the Chaoborus punctipennis larvae in a NE Georgia impoundment. To estimate the threshold, number of animals in each 15-minute interval sample and, above this, logarithm of light measured every 15 minutes were plotted against time. Mid-point between the last sample showing a low (or 'daytime') number of animals in water column and the first sample exhibiting a high (or 'nighttime') number, was taken as the start of nocturnal migration. By knowing the time nocturnal migration commenced, it was possible to take the light level at this point to be the observed field threshold for the evening's sample. Light threshold controlling migration from sediment into water column in the evening was 2.44 lux in winter, changing in spring, the seasonal change in light period affecting the animals. Laboratory experiments gave a mean threshold value of 7.44 lux, and showed the animals were most stimulated by light between 500 and 600 millimicrons. (Jones-Wisconsin)
W73-11943

ZOOPLANKTON COMPOSITION AND CHANGE IN AN ALPINE LAKE,
Calgary Univ. (Alberta). Dept. of Biology.
R. S. Anderson.
Verhandlungen der Internationalen Limnologie, Vol 18, p 264-268, 1972. 2 fig, 1 tab, 9 ref.

Descriptors: *Zooplankton, *Alpine, *Lakes, Canada, Fish stocking, Rotifers, Crustaceans, Daphnia, Copepods, Fish food organisms.
Identifiers: Banff National Park (Canada), Bighorn Lake (Canada), Pipit Lake (Canada), Snowflake Lake (Canada), Diaptomus tyrrelli, Cyclopoids.

Previously fish-free lakes in Banff National Park, Canada, containing Diaptomus articus and either Daphnia pulex or Daphnia middendorffiana, were stocked with hatchery-reared trout. These large species dominate zooplankton, and rotifers are usually scarce in alpine and subalpine lakes of this area. In Snowflake Lake, sampled for six years beginning in 1966 at intervals of 2 to 4 weeks throughout as much of each year as feasible, the last individuals of large crustacean species were collected. The apparent simplicity and stability of the zooplankton community provided a seemingly ideal situation for the life cycle study of Diaptomus tyrrelli. In subsequent years it became obvious that this community was neither simple nor stable. Scarcity of rotifers in the presence of certain copepods, abundance of rotifers after fish introduction, and subsequent elimination of copepods is supported by earlier findings. If no more fish are stocked in Snowflake Lake and present stocks continue to decline, Cyclops vernalis might increase and D. tyrrelli decrease numerically. On the other hand, if D. articus attains its former abundance either through reintroduction or a possible residium which have escaped fish predation, the zooplankton community could revert to its original character. (Jones-Wisconsin)
W73-11944

EFFECTS OF DEFORESTATION ON WATER QUALITY,
Cornell Univ., Ithaca, N.Y. Section of Ecology and Systematics.
For primary bibliographic entry see Field 04C.
W73-11945

EFFECT OF DIVERSION OF DOMESTIC WASTE WATERS ON PHOSPHORUS CONTENT AND EUTROPHICATION OF THE MADISON LAKES,
Wisconsin Univ., Madison. Water Chemistry Program.
W. C. Sonzogni, and G. F. Lee.
In: 73rd National Meeting, American Institute of Chemical Engineers, August 1972, Minneapolis,

Minnesota. (Preprint). 30 p. 6 fig, 2 tab, 34 ref. EPA 16010 EHR.

Descriptors: *Diversion, *Sewage effluents, *Phosphorus, *Eutrophication, Wisconsin, Lakes, Water quality, Mathematical models, Sewage treatment, Nitrogen, Nutrients, Nuisance algae, Water pollution control.
Identifiers: *Madison (Wis), Lake Waubesa (Wis), Lake Kegonsa (Wis), Lake Monona (Wis), Lake Wingra (Wis), Yahara River (Wis), Rock River (Wis), Receiving waters, Badfish Creek (Wis), Lake recovery.

The use of elementary mathematical relationships to determine the expected rate of recovery of excessively fertilized lakes after a reduction in the phosphorus input is discussed and a prediction of the effect of a recent waste water effluent diversion at headwaters of the Madison, Wisconsin, lakes is presented. Pertinent physical characteristics of the lakes are summarized. Earlier diversions and current sewage diversion areas are given, including a history of waste treatment and disposal with the effect of the earlier diversions. The most recent sewage diversion occurred in December 1971, when the waste waters from two small municipalities north and west of Madison were diverted from Lake Mendota. As part of a project aimed at modeling the aqueous environmental chemistry of nitrogen and phosphorus in Lake Mendota, amounts and forms of nitrogen and phosphorus as well as other parameters, are being determined at meter depth intervals in the lake each week. It is predicted that a new equilibrium phosphorus content will be reached in Lake Mendota in about 1975, or about three years after the reduction in the phosphorus influx resulting from the waste water diversion. (Jones-Wisconsin)
W73-11946

PHOTOSYNTHESIS BY ALGAL EPIPHYTES OF UTRICULARIA IN EVERGLADES NATIONAL PARK,
Indiana Univ., Bloomington. Dept. of Microbiology.
T. D. Brock.
Bulletin of Marine Science, Vol 20, No 4, p 952-956, 1970. 1 fig, 1 tab, 3 ref.

Descriptors: *Aquatic plants, *Photosynthesis, *Algae, Florida, Primary productivity, Chlorophyll, Carbon cycle.
Identifiers: *Epiphytic algae, *Utricularia, *Everglades National Park (Fla).

Studies on photosynthesis, as measured by the C-14 method, in Utricularia and its associated algal epiphytes are described. During some observations in the Shark River system of Everglades National Park, it was observed that new shoots of the macrophytes, Utricularia purpurea and U. lutea, were bright green, whereas older shoots were a dull brown color. The color of the latter shoots was due primarily to a heavy population of epiphytic diatoms, desmids, and blue-green algae. Photosynthesis measured on epiphyte-free and epiphyte-containing fronds and the chlorophyll content and epiphyte content were estimated simultaneously. Processing involved homogenization, filtration of aliquots for C-14 counting, and extraction of aliquots for chlorophyll. Epiphyte content was estimated visually and microscopically on the homogenate samples. The results provide evidence that the rate of photosynthesis is much greater in epiphyte-laden Utricularia than in epiphyte-free plants, which leads to the suggestion that the epiphytes, rather than the macrophytes, are responsible for most of the primary production in this aquatic ecosystem. (Jones-Wisconsin)
W73-11947

EVIDENCE FOR TWO LIGHT-DRIVEN REACTIONS IN THE PURPLE PHOTOSYNTHETIC BACTERIUM, RHODOSPIRILLUM RUBRUM,
Illinois Univ., Urbana. Dept. of Physiology and Biophysics.
C. Sybesma, and C. F. Fowler.
Proceedings of the National Academy of Sciences, Vol 61, No 4, p 1343-1348, 1968. 3 fig, 25 ref.

Descriptors: *Biochemistry, *Photosynthesis, *Bacteria, Light intensity, Pigments, Light, Photoactivation.
Identifiers: *Rhodospirillum rubrum, Chloropseudomonas ethylicum, Cytochromes, Bacteriophyll, Light reactions.

Kinetic and spectral separation of light-induced oxidation of C428 and cytochrome c2 in Rhodospirillum rubrum, using moderate intensities of actinic light, under strict anaerobic conditions with cell suspension depleted of substrate, are reported. This separation allowed measurement of action spectra of light-induced oxidation of each cytochrome. Apparent difference between the action spectra resulting from such measurements indicated that each of the cytochromes is involved in a separate light reaction. Measurements of light-induced absorbance changes were made with a 'split-beam' absorption difference spectrophotometer. The kinetic pattern of light-induced absorbance changes in R. rubrum in the spectral region between 400 and 600 nm is largely dependent on the intensity of the actinic light. Although the action spectra still allow a trivial interpretation in which the photosynthetic pigment system contains two regions in which the light-harvesting pigments B890 (bulk of bacteriochlorophyll) and P800 (the minor component responsible for the absorption band at 804 nm) are present in different ratios, the simplest explanation of the present data involves two different light-driven reactions. One light reaction involves the oxidation of a pigment, C428, presumably a cytochrome. The second light reaction involves the oxidation of cytochrome c2. (Jones-Wisconsin)
W73-11948

SEASONAL DISTRIBUTION OF CHONDROCOCCUS COLUMNARIS INFECTION IN RIVER FISHES AS DETERMINED BY SPECIFIC AGGLUTININS,
Battelle Memorial Inst., Richland, Wash. Pacific Northwest Labs.
M. P. Fujihara, and F. P. Hungate.
J Fish Res Board Can. Vol 29, No 2, p 173-178, 1972. Illus.
Identifiers: Agglutinins, *Chondrococcus-columnaris, Columbia River, Distribution pattern, Infection, Prosopium-williamsoni, Rivers, Seasonal, Snake River, *Washington, Whitefish, *Fish populations.

River fish populations (in Washington) infected with C. columnaris disease were surveyed by measurements of C. columnaris agglutinating antibodies in blood sera of fishes and by isolation of the pathogen using microbiological plating methods. Agglutinins were demonstrated in all 13 fish species collected except whitefish (Prosopium williamsoni). Blood serum from samples of fishes at 4 Columbia River sites during 1965 and 3 Columbia River sites and 1 Snake River site during 1969-70 demonstrated single annual cycles of C. columnaris antibody production. During the 2 annual sampling periods, the magnitude of antibody titers and frequency of fish with agglutinins increased in warm water and declined in cool water. The rise in titers occurred after a winter low, and usually followed the period when the first C. columnaris organisms were isolated from native fish. Agglutinating titers up to 1:5000 were found but most peak titers were between 1:320 and 1:640.—Copyright 1972, Biological Abstracts, Inc.
W73-11949

INFLUENCE OF DILUTION, SINKING AND GRAZING RATE ON PHYTOPLANKTON POPULATIONS OF HYPERFERTILIZED PONDS AND MICROECOSYSTEMS,
Technische Universitaet, Dresden (East Germany). Bereich Hydrobiologie.
D. Uhlmann.
Mitteilungen Internationale Vereinigung Limnologie, Vol 19, p 100-124, 1971. 13 fig, 2 tab, 37 ref.

Descriptors: *Phytoplankton, *Nutrients, *Growth rates, *Eutrophication, Light, Biomass, Equations, Sewage lagoons, Chlorella, Scenedesmus, Biological communities, Daphnia, Productivity, Mathematical studies.
Identifiers: *Change of biomass, Cropping factors.

An overall-rate-of-change equation of phytoplankton biomass is proposed, in which gains are represented by importation and growth, losses by dilution, grazing and sedimentation. All rate-constants are assumed to be proportional to biomass concentration of phytoplankton. This is evident for dilution from theoretical considerations and for sedimentation from experimental results. In standing water, with decreasing nutrient load, genera with high saturation constants for phosphate uptake (Saprophytic bacteria, Chlorophyta) apparently become substituted by forms with lower saturation constants (Chrysophyta, Cyanophyta, Pyrrhophyta). On the laboratory scale, aquaria vessels of 4 or 16 liter capacity were operated singly or in series on a modified fill and draw basis as semicontinuous-flow models of sewage ponds. Given a certain dilution rate, computation not only of growth rate, but also of sinking rate and grazing rate in this steady-state situation was possible by means of simple arithmetic equations. The biomass concentration of phytoplankton remained fairly constant when dilution rate was stepwise increased from 0.025 to 0.2. In a two-stage semicontinous-flow model, with growth of Chlorella in the first and of Daphnia in the second stage, outwash of Daphnia occurred at a dilution rate of more than 0.3. (Jones-Wisconsin)
W73-11950

NET PLANKTON AND NANOPLANKTON PRODUCTION AND BIOMASS IN A NORTH TEMPERATE ZONE LAKE,
McGill Univ., Montreal (Quebec). Dept. of Biology.
J. Kalff.
Limnology and Oceanography, Vol 17, No 5, p 712-720, 1972. 6 fig, 1 tab, 32 ref.

Descriptors: *Plankton, *Nanoplankton, *Primary productivity, *Biomass, Lakes, Temperate, Eutrophication, Epilimnion, Cyanophyta, Diatoms, Stratification, Canada, Photosynthesis.
Identifiers: *Lac Hertel (Quebec).

The fractions of the primary production contributed by the nanoplankton in Lac Hertel, a small naturally eutrophic lake in Quebec, are determined. The present degree of eutrophication was reached virtually without man's direct influence. Allochthonous organic matter in the form of deciduous leaves and dissolved organic matter enter the lake through the brooks, runoff, or by wind action. Generally oligotrophic lakes have a planktonic flora containing a high proportion of nanoplankton while eutrophic waters have a standing crop much more dominated by the net plankton, although the proportions are highly variable. This study shows that even at times when the net plankton were very conspicuous the nanoplankton were responsible for much of the photosynthate produced. Selective filtration showed that on an annual integrated basis between 75 and 79% of production in 1966 and 1967 was synthesized by the nanoplankton. In 1967 the net plankton contributed more than half of the recorded epilimnetic biomass on one occasion but never more than half

the daily production. The conspicuous blue-green alga-diatom complex that characterized the lake during stratification was photosynthetically inefficient as compared to the nanoplankton. (Jones-Wisconsin)
W73-11951

ALKALINE PHOSPHATASE ACTIVITY IN THE TROPICAL MARINE BLUE-GREEN ALGA, OSCILLATORIA ERYTHRAEA ('-TRICHODESMIUM'),
Massachusetts Univ., Gloucester. Marine Station; and Nova Univ., Dania, Fla. Physical Oceanographic Lab.
C. M. Yentsch, C. S. Yentsch, and J. P. Perras.
Limnology and Oceanography, Vol 17, No 5, p 772-774, 1972. 1 tab, 5 ref.

Descriptors: *Nutrient requirements, *Marine algae, *Cyanophyta, Florida, Phosphates, Nitrogen fixation, Enzymes, Metabolism, Hydrogen ion concentration.
Identifiers: *Alkaline phosphatase, *Oscillatoria erythraea.

Oscillatoria erythraea, widespread in low-nutrient tropical waters, is able to maintain its nitrogen requirement by nitrogen fixation and its phosphorus requirement by the production of alkaline phosphatases, enzymes which enable the organisms to remove the inorganic phosphate radical from organically bound phosphate. The significance of the presence of phosphatase in natural populations is that the algae have overcome growth limitation by inorganic phosphate by having the capacity to metabolize organic phosphates. The activity of this enzyme in Oscillatoria erythraea was investigated. Alkaline phosphatase activity was found to be operating at the time of collection at nutrient levels of inorganic phosphate between 0.11 and 0.34 microgram-atom/liter. Alkaline phosphatase activity was not demonstrated in phytoplankton collected from coastal waters, where nutrient levels are much higher. Insufficient inorganic phosphate in the water surrounding the cells results in induction or activation of the enzyme, or both. The phosphatase action, along with its ability for nitrogen fixation, provides a mechanism for the survival of this organism in the low-nutrient waters in which it is found. (Jones-Wisconsin)
W73-11952

EFFECT OF CLAY ON THE AVAILABILITY OF DILUTE ORGANIC NUTRIENTS TO STEADY--STATE HETEROTROPHIC POPULATIONS,
Alaska Univ., College. Inst. of Marine Science.
D. K. Button.
Limnology and Oceanography, Vol 14, No 1, p 95-100, 1969. 5 fig, 10 ref.

Descriptors: *Clays, *Nutrients, *Organic matter, *Microorganisms, Suspended solids, Bentonite, Yeasts, Vitamin B, Biochemistry, Adsorption, Alaska, Hydrogen ion concentration, Phosphates, Sediments.
Identifiers: Glucose.

Chemical analyses of certain systems have been interpreted to show that clays and sediments are effective in adsorbing organic compounds from solution. Amount of adsorption determines the effect of clays on the dissolved organic chemistry of sediment-laden water systems. This effect on availability of small organic molecules to microorganisms was determined. Changes in available substrate concentration can be determined by observing changes in steady-state concentration of organisms at a particular rate. Since a low binding constant for the clay-thiamine association was indicated, binding ability of clay was further tested with the carbon source--glucose. Recovered suspended sedimentary material and Bentonite were tested for their ability to compete with yeast and bacteria for thiamine or glucose in continuous culture systems at low organism concentrations. The added clays do not render the organics tested unavailable to microorganisms or remove them from solution to a detectable or significant extent. The addition of clays can, however, effect a perturbation to the steady system, possibly by altering the inorganic chemistry of the dissolved phase. It seems unlikely that in natural systems the level of suspended organisms using small organic molecules is materially influenced by the level of suspended sedimentary material. (Jones-Wisconsin)
W73-11954

PRESERVING THE GREAT LAKES,
Resources Development Consultants, Inc. Fort Collins, Colo.
For primary bibliographic entry see Field 05B.
W73-11955

SOME FACTORS INFLUENCING KINETIC CONSTANTS FOR MICROBIAL GROWTH IN DILUTE SOLUTION,
Alaska Univ., College. Inst. of Marine Science.
D. K. Button.
In: Proceedings of Symposium on Organic Matter in Natural Waters, University of Alaska, Fairbanks Institute of Marine Science Occasional Publication No. 1, 1970. p 537-547, 5 fig, 6 ref. OWRR A-023-ALAS (3).

Descriptors: *Biochemistry, *Kinetics, *Growth rates, *Microorganisms, Nutrients, Diffusion, Mixing, Temperature, Hydrogen ion concentration, Heavy metals, Yeasts, Vitamin B, Equations, Mathematical studies, Copper.
Identifiers: Cryptococcus albidus, Cryptococcus utilis.

Growth velocity is normally an increasing function of limiting substrate concentrations. The means by which growth velocity of a yeast cell Cryptococcus albidus varies with the vitamin thiamine at the cell surface is shown. Where growth rate is limited at the cell surface by nutrient transport the system can be likened to substrate competition for passage through a matrix of doors. These doors at the cell surface are chemical in nature and subject to closing (chemical modification) by inhibitory components of the medium. Long term substrate limited growth at low population can respond to concentration in a different way than short term substrate uptake. A higher heavy metal tolerance at the expense of a less efficient transport system which lowers the total standing crop at a given level of nutrients is indicated. Thus, with addition of copper the rate of growth of Rhodotorula glutinis, a marine pink yeast, was sharply reduced. Mixing, temperature, nutrient concentration and inhibitor concentration all affect the efficiency and rate at which microbial processes occur and effects can be described in a rational manner. (Jones-Wisconsin)
W73-11956

OCCURRENCE, DISTRIBUTION AND DENSITY OF RANGIA CUNEATA IN LAKES PONTCHARTRAIN AND MAUREPAS, LOUISIANA,
Louisiana Wild Life and Fisheries Commission, New Orleans.
J. W. Tarver.
Available from the National Technical Information Service as COM-73-10026, $3.00 in paper copy, $0.95 in microfiche. Technical Bulletin No. 1, 1972. 8 p. 2 fig, 1 tab, 18 ref.

Descriptors: *Population, *Clams, *Distribution, *Density, Louisiana, Size, Brackish water.
Identifiers: *Rangia cuneata, *Lake Pontchartrain (La), *Lake Maurepas (La).

Dead clam shells worth several million dollars are harvested from Lakes Pontchartrain and Maurepas, Louisiana, annually. A determination was made of the present occurrence, abundance, and size distribution of Rangia cuneata in these lakes. Benthic samples were taken throughout the lakes from 15 selected areas on a monthly basis, and additional random samples were taken during the study period from November 1, 1969 through November 31, 1970. Depth, bottom type, salinity, and temperature were recorded with each sample. The data indicate that Rangia populations in Lakes Pontchartrain and Maurepas were stable with no major fluctuations occurring during the sample period. Very few clams were collected from hard, sand-bottomed areas. Though all the monthly stations indicated that the Rangia mean height varied from month to month, the populations were stable, having no major fluctuations in mean height during the study. The presence of low salinity, high turbidity, and a substrata of sand, mud and vegetation remnants during the sample period seems to have resulted in a high clam density, and consequently, a small clam size. (Jones-Wisconsin)
W73-11957

EFFECTS OF ARTIFICIAL AERATION ON THE CHEMISTRY AND ALGAE OF TWO MICHIGAN LAKES,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
A. W. Fast, B. Moss, and R. G. Wetzel.
Available from the National Technical Information Service as COO159950, $3.00 in paper copy, $1.45 in microfiche. (1972) 57 p. 18 fig, 29 ref. EPA 16010 EXE.

Descriptors: *Water treatment, *Aeration, *Lakes, Destratification, Michigan, Biota, Water chemistry, Hypolimnion, Thermal stratification, Phytoplankton, Primary productivity, Mixing, Alkalinity, Oxygen, Turbidity, Temperature, Hydrogen ion concentration, Foaming, Cycling nutrients, Algae.
Identifiers: *Compressed air, Section Four Lake (Mich), Hemlock Lake (Mich).

Using compressed air, an unproductive hard water lake was destratified, and a eutrophic lake had its hypolimnion aerated while thermal stratification was maintained. Both lakes were studied during 1969 as a control period, and aerated during 1970. Aeration effects on the biota and on some chemical factors were measured. Hemlock and Section Four Lakes, in Pigeon River State Forest, near the Straits of Mackinaw, Michigan, are lime sink lakes; Section Four is a typical unproductive marl lake, while Hemlock is an atypical marl lake, being both productive and meromictic. Although it has high alkalinity, with marl deposits in shallow water, these sediments are covered with a thick layer of peaty organic material that originated mostly from the bordering forest and marsh. Chemical and algal changes in Section Four Lake during destratification were not great. Although phytoplanktonic production potentials increased during mixing, phytoplankton standing crop appeared to decline slightly, possibly due to increased mixing depth and turbidity. Hemlock Lake hypolimnetic anoxia and associated conditions were eliminated during aeration. The lake gradually destratified during aeration due to leaks in the aeration tower which released nutrient-rich water into the epilimnion, promoting algal growth. (Jones-Wisconsin)
W73-11958

EXPOSURE TIMES NECESSARY FOR ANTIMYCIN AND ROTENONE TO ELIMINATE CERTAIN FRESHWATER FISH,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
P. A. Gilderhus.
J Fish Res Board Can. Vol 29, No 2, p 199-202. 1972.
Identifiers: *Antimycin, Bullhead, Exposure, Fish, *Rotenone, Times, *Fish mortality.

In laboratory flowing-water troughs exposure required to induce 100% mortality, regardless of time to death for antimycin and rotenone against selected freshwater fish species was determined. Carp and white suckers required shorter exposures to antimycin (6 hr) than to rotenone (18-24 hr) at field-use concentrations of 5 and 50 ppb, respectively. Bullheazds were killed by 3-10 hr exposure to 100-250 ppb rotenone at 17 C or higher. However, the long exposure time necessary in colder water (25 hr at 100 ppb in 12 C water) made elimination of bullheads with rotenone difficult in cold seasons. Exposure time was influenced more by water temperature than by the toxicant concentration. The effects of rotenone were often reversible even after fish had been on their sides in the toxicant solution for 4-5 hr but irreversible for antimycin after fish showed the first signs of distress.--Copyright 1972, Biological Abstracts, Inc.
W73-11961

DECOMPOSITION OF DISSOLVED ORGANIC CARBON AND NITROGEN COMPOUNDS FROM LEAVES IN AN EXPERIMENTAL HARDWATER STREAM,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
R. G. Wetzel, and B. A. Manny.
14 P, 3 FIG, 21 REF. (1972) AEC AT (11-1)-1599, NSF GB-28900X.

Descriptors: *Decomposing organic matter, *Dissolved organic matter, *Carbon, Nitrogen compounds, Leaves, Streams, Hardness (Water), Bacteria, Organic matter, Microbial degradation, Cycling nutrients.

Bacterial decomposition rates of labile and refractory components of dissolved organic carbon and nitrogen compounds in natural leaf leachate are interpreted in relation to their importance in the metabolism of lakes receiving residual organic compounds from streams. Evidence is presented that dissolved organic matter flux in streams is controlled heterotrophically by bacterial utilization rates of organic compounds as is the case in lake metabolism. Addition of dry hickory and maple leaves, for 30 hours in laboratory recirculating streams permitted detailed examination of leaf leachate impact on the general structure and function of the stream ecosystem, closely simulating natural hardwaters woodland streams. Total dissolved organic carbon concentrations of the filtrates were measured and total dissolved organic nitrogen was fractionated into labile and refractory components by ultraviolet combustion and spectrophotometric analyses. Bacterial populations developed and decomposed labile dissolved organic carbon and nitrogen compounds from leaf leachate within 72 hours and then rapidly became carbon limited. Refractory organic nitrogen compounds persisted unmodified over 24 days. The processing capacity of woodland streams for natural dissolved organic compounds is much greater than previously believed but may be less effective for dissolved organic effluents of human origin. (Jones-Wisconsin)
W73-11962

THE PROBLEM OF PHOSPHORUS IN NEW YORK'S WATERS.
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 05G.
W73-12012

ENTOMOLOGICAL SPECIAL STUDY NO. 44--013-72/73, LABORATORY EVALUATION OF RESIDUES MAINTAINED IN WATER TREATED WITH POLYETHYLENE FORMULATIONS OF CHLORPYRIFOS, DECEMBER 1971-APRIL 1972,
Army Environmental Hygiene Agency, Edgewood Arsenal, Md.
For primary bibliographic entry see Field 05F.
W73-12042

TESTS OF RHODAMINE WT DYE FOR TOXICITY TO OYSTERS AND FISH,
Geological Survey, Tacoma, Wash.
G. G. Parker Jr.
Journal of Research, U. S. Geological Survey, Vol 1, No 4, p 499, July-August 1973. 1 ref.

Descriptors: *Toxicity, *Dye releases, *Flourescent dye, Oysters, Fish, Salmon, Trout.
Identifiers: *Rhodamine WT.

Because of the toxicity of rhodamine B dye in concentrations greater than 1 mg/liter to oyster larvae an d eggs in earlier tests there is some concern that rhodamine WT, a similar tracer dye, would have a detrimental effect on marine life. Exposures for 48 hours at 24C of oyster eggs and 12-day-old larvae in seawater with concentrations of rhodamine WT, ranging from 1 microgram/liter to 10 mg/liter, resulted in development of the eggs to normal larvae and no abnormalities in the larvae development. Tests made on the smolt of both silver salmon and Donaldson trout, with the fish held for 17.5 hours in a tank full of seawater with a dye concentration of 10 mg/liter at 22C, showed no mortalities or respiratory problems. With the concentration increased to 375 mg/liter, and the time extended an additional 3.2 hours, still no mortalities or abnormalities were noted. The fish remained healthy in dye-free water when last checked a month after the test. (Knapp-USGS)
W73-12068

STUDIES ON FRESHWATER MICRO-ORGANISMS: PHOSPHATASE ACTIVITY IN LAKES OF DIFFERING DEGREES OF EUTROPHICATION,
Freshwater Biological Association, Windermere (England).
J. G. Jones.
Journal of Ecology, Vol 60, No 3, p 777-791, November 1972. 10 fig, 2 tab, 23 ref.

Descriptors: *Biomass, *Eutrophication, *Lakes, *Aquatic microorganisms, *Epilimnion, *Hypolimnion, Artificial substrates, Dinoflagellates, Diatoms, Phosphorus, Bioindicators, Enzymes, Trophic level, Nutrients, Pyrrophyta, Protozoa, Water sampling, Biological properties, Chemical properties, Chemical analysis, Assay, Aquatic bacteria, Aquatic algae, Lake morphometry, Cultures, Phosphates, Dissolved oxygen, Cyanophyta, Chrysophyta.
Identifiers: *Alkaline phosphatase, *Enzyme activity, p-Nitrophenol phosphate, Chlorophyll a, Heterotrophic bacteria, Substrate utilization, Ceratium, Sample preparation, Organic phosphorus, Lake Westwater, Lake Ennerdale, LAKE Buttermere, Lake Crummock, Lake Coniston, Lake Thirlmere, Lake Windermere, Lake Ullswater, Lake Derwentwater, Lake Bassenthwaite, Lake Loweswater, Lake Rydal Water, Lake Grasmere, Lake Esthwaite Water, Lake Blelham Torn, Microcystis, Asterionella, Pseudoanabaena.

Sixteen lakes in the English Lake District were examined during the period of thermal stratification. Epilimnetic samples were analyzed for total phosphorus, total soluble phosphorus and soluble inorganic phosphorus (P sub i) concentrations, chlorophyll a, viable bacteria and alkaline phosphatase activity. Temperature and dissolved oxygen readings enabled the position of the thermocline to be determined and the degree of hypolimnetic oxygen deficit to be assessed. The lakes were placed in a series in order of increasing degree of eutrophication. Total phosphorus and chlorophyll a concentrations, bacterial numbers, hypolimnetic oxygen deficit and phosphatase activity measurements appeared to fit this series and so supported this classification which was based mainly on that of Pearsall (1921). Two methods were used to assess phosphatase activity, one based on the use of an artificial substrate, p-nitrophenol phosphate (PNP-PO4) and the other on the natural release of P sub i in stored water samples. Both methods produced results which were significantly correlated with total phosphorus levels of the water samples and also with microbial biomass. Repression and/or inhibition of alkaline phosphatase in relation to phosphorus levels found in the lakes was not satisfactorily demonstrated, but the variety of factors affecting these two control mechanisms (particularly inhibition) is such that a more detailed survey of each water body would be required. The high degree of correlation between the two variables indicated that the enzyme was a good indicator of biomass present and degree of eutrophication, except in samples where very high numbers of the dinoflagellate Ceratium sp. were present. The organism was found to contain significantly lower levels of the enzyme than those found in other micro-organisms. (Holoman-Battelle)
W73-12089

LOCATION AND CONSEQUENCES OF 1,1,1--TRICHLORO-2,2-BIS (P-CHLOROPHENYL) ETHANE UPTAKE BY BACILLUS MEGATERIUM,
Michigan State Univ., East Lansing. Dept. of Microbiology and Public Health.
For primary bibliographic entry see Field 05B.
W73-12091

RESISTANCE TO COLIPHAGE INFECTION INDUCED IN ESCHERICHIA COLI BY GROWTH IN THE PRESENCE OF A SURFACTANT,
California State Univ., Los Angeles. Dept. of Microbiology and Public Health.
I. H. Koransky, and D. A. Anderson.

Descriptors: *Surfactants, *E. coli, *Slime, *Adsorption, Cultures, Bioassay, Water pollution effects, Inhibitors, Infection, Bacteriophage.
Identifiers: *Coliphage, Sodium dodecyl benzene sulfonate, DNA.

To test the hypothesis that slime formation induced by surfactants may inhibit phage adsorption, strains of E. coli were streaked on nutrient agar containing sodium dodecyl benzene sulfonate (NaDDBS) and seeded with droplets of representative T-even and T-odd phage strains. The results suggest that the surfactant induced slime may mechanically block phage receptor sites, inhibiting phage adsorption. The major blocking agent may well be deoxyribonucleic acid, as indicated by the high viscosity and induction of phage adsorption and replication after treatment with deoxyribonuclease. (Little-Battelle)
W73-12105

THE TOXICITY OF HEAVY METALS TO EMBRYOS OF THE AMERICAN OYSTER CRASSOSTREA VIRGINICA,
National Marine Fisheries Service, Milford, Conn. Biological Lab.
A. Calabrese, R. S. Collier, D. A. Nelson, and J. R. MacInnes.
Marine Biology, Vol 18, No 3, p 162-166, February 1973. 2 tab, 28 ref.

Descriptors: *Heavy metals, *Embryonic growth stage, *Toxicity, *Bioassay, Mollusks, Lethal limit, Water pollution effects, Mortality, *Oysters, Invertebrates, Aluminum, Cadmium, Copper, Chromium, Lead, Manganese, Mercury, Nickel, Zinc, Laboratory tests, Larval growth stage, Larvae, Pollutants.
Identifiers: American oyster, *Crassostrea virginica, Median tolerance limit, Eastern oyster, Silver, Pelecypods, Arsenic.

The acute toxicity of 11 heavy metals tested as inorganic metallic salts to embryos of the American oyster Crassostrea virginica was studied and the concentrations at which 50 percent of the embryos did not develop were determined. Static tests were conducted throughout the study and all tests were

initiated within one hour after the eggs of the oyster were fertilized. Tests were terminated after 42 to 48 h. To determine the effect of metal toxicity on embryonic development, the embryos that survived and developed into larvae in each culture were collected on a 36-micron nylon screen, resuspended in a 250-ml graduated cylinder and, after thorough stirring to insure uniform distribution of the larvae, a 4-ml quantitative sample was removed and preserved in 5 percent neutral formalin. The samples were examined under a compound microscope and the number of embryos that had survived and developed into larvae was counted. The most toxic metals and their LC sub 50 values were mercury (0.0056 ppm), silver (0.0058 ppm), copper (0.103 ppm) and zinc (0.31 ppm). Those metals that were not as toxic and their LC sub 50 values were nickel (1.18 ppm), lead (2.45 ppm) and cadmium (3.80 ppm). Those metals that were relatively non-toxic and their LC sub 50 values were arsenic (7.5 ppm), chromium (10.3 ppm) and manganese (16.0 ppm). Aluminum was non-toxic at 7.5 ppm, the highest concentration tested. (Holoman-Battelle)
W73-12113

TOXICITY STUDIES ON THE COMPONENTS OF AN OIL-SPILL EMULSIFIER USING LICHINA PYGMAEA AND XANTHORIA PARIETINA,
Bristol Univ. (England). Dept. of Botany.
D. H. Brown.
Marine Biology, Vol 18, No 4, p 291-297, February 1973. 2 fig, 3 tab, 12 ref.

Descriptors: *Bioassay, *Chlorophyta, *Cyanophyta, *Lichens, *Photosynthesis, *Toxicity, *Plant pigments, *Surfactants, Emulsifiers, Inhibition, Water pollution effects, Radioactivity effects, Radioactivity techniques, Separation techniques, Plant physiology.
Identifiers: *BP 1002, *Oil-spill emulsifiers, *Lysis, Lichina pygmaea, Xanthoria parietina, Chlorella pyrenoidosa, Anabaena cylindrica, Organic solvents.

The response of the lichens Lichina pygmaea and Xanthoria parietina to components of the emulsifier BP 1002 was studied, and comparison made to the behavior of the free-living green alga chlorella pyrenoidosa and the blue-green alga Anabaena cylindrica. Inhibition of photosynthetic C-14-fixation by the emulsifier solvent alone was observed with both lichens. No alteration of the pattern of C-14 recovery in the various fractions was observed. Following treatment with either surfactant, total C-14-fixation was strongly inhibited; increased recovery of C-14 kin the solution fraction occurred, mainly at the expense of the alcohol-extract fraction. Surfactant B was more active in this respect than Surfactant A, and its effect was attributed to induced leakiness of the algal cell membranes. Photosynthesis of C. pyrenoidosa and A. cylindrica was inhibited totally by 1 percent emulsifier, and the latter alga lysed rapidly with 90 percent loss of the C-14 fixed. Observations on pigment loss showed removal of the extra-cellular pigment parietin from X. parietina by the solvent to be slightly enhanced by addition of either surfactant. L. pygmaea was unaffected by the solvent; both surfactants caused loss of lipid-soluble photosynthetic pigments, but only Surfactant B induced loss of an unknown water-soluble pigment. (Little-Battelle)
W73-12115

THE EFFECTS OF AMMONIUM AND PHOSPHATE ENRICHMENTS ON CHLOROPHYLL A, PIGMENT RATIO AND SPECIES COMPOSITION OF PHYTOPLANKTON OF VINEYARD SOUND,
Marine Biological Lab., Woods Hole, Mass. Boston Univ. Marine Program.
S. Vince, and I. Valiela.
Marine Biology, Vol 19, No 1, p 69-73, March 1973. 3 fig, 2 tab, 14 ref.

Descriptors: *Diatoms, *Limiting factors, *Phosphates, *Plant pigments, *Growth rates, Phytoplankton, Nutrients, Bioassay, Nitrogen.
Identifiers: *Chlorophyll a, *Ammonium, Asterionella japonica, Skeletonema costata, Chaetoceros spp, Vineyard Sound, Enrichment.

Seawater containing natural phytoplankton populations (dominant species: Asterionella japonica, Skeletonema costata, and Chaetoceros spp.) from Vineyard Sound, was enriched in the laboratory with three levels each of ammonium and phosphate and with a combination of ammonium and phosphate which provided three different N:P ratios. The addition of ammonium produced more cells and chlorophyll a than the control or the phosphate enrichments. However, enrichment with ammonium and phosphate, regardless of the N:P ratio, yielded the most cells and chlorophyll a. Thus, nitrogen seems to be the primary limiting nutrient, with phosphate showing secondary limiting effects. The ratios of photosynthetic pigments D430/D663 decreased with the increased chlorophyll a production in the enriched cultures. There were no significant changes in the species composition within the cultures, so that the observed changes in pigment ratio and chlorophyll a content were due to physiological responses. (Little-Battelle)
W73-12116

THE EFFECTS OF CHLORINATION OF WASTEWATER ON FERTILIZATION IN SOME MARINE INVERTEBRATES,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
D. Muchmore, and D. Epel.
Marine Biology, Vol 19, No 2, p 93-95, March 1973. 2 tab, 8 ref.

Descriptors: *Chlorination, *Fertilization, *Worms, *Annelids, *Bioassay, Toxicity, Invertebrates, Chlorine, Sewage treatment, Reproduction, Productivity, Marine animals, Water pollution effects, Domestic wastes, Sewage, Sea water, Fecundity.
Identifiers: *Sea urchins, Strongylocentrotus purpuratus, Urechis caupo, Phragmatopoma californica, Macroinvertebrates, Survival, Echinoderms, Echiuroids.

Gametes were collected from the sea urchin, Strongylocentrotus purpuratus, the echiuroid, Urechis caupo, and the annelid, Phragmatopoma californica, for studies on the effect of chlorination of domestic sewage on fertilization. Two hundred eggs were used in each sample with sperm concentrations of 0.033, 0.010, and 0.003 percent. In controls, fertilization always exceeded 98 percent. Fresh chlorinated and unchlorinated sewage from the Pacific Grove, California sewage treatment facility was used in the tests. Unchlorinated domestic sewage was a relatively weak inhibitor of external fertilization in the 3 marine invertebrates. Chlorinated sewage was a potent spermicide, active in inhibiting fertilization in concentrations of available chlorine as low as 0.05 ppm. Sodium hypochlorite in seawater duplicated the effect, and excess sodium thiosulfate terminated it. The possibility of chlorine disinfection affecting reproductive success in the vicinity of outfalls is discussed. (Little-Battelle)
W73-12117

EFFECT OF ZINC ON GROWTH AND DEVELOPMENT OF LARVAE OF THE PACIFIC OYSTER CRASSOSTREA GIGAS,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
A. Brereton, H. Lord, I. Thornton, and J. S. Webb.
Marine Biology, Vol 19, No 2, p 96-101, March 1973. 4 fig, 1 tab, 14 ref.

Descriptors: *Bioassay, *Growth rates, *Zinc, *Mortality, Larvae, *Oysters, Heavy metals, Reproduction, Toxicity, Productivity, Water pollution effects, Fecundity, Animal physiology, Marine animals, Animal pathology.
Identifiers: *Crassostrea gigas, *Teratogenicity, Macroinvertebrates, Zinc sulfate, England, North Wales, Teratogens, Pacific Oyster.

Following the observation of periodic high concentrations of zinc in estuarine waters used in the White Fish Authority's oyster hatchery at Conway, North Wales, two beaker trails were conducted to study the effect of zinc, over the range recorded, on the young stages of larvae of Crassostrea gigas. Zinc, added to sea water both as zinc sulfate and as a natural mine-adit water, was applied for a period of 5 days, after which larvae were maintained for a further 5 days in sea water alone. Increasing concentrations over the range 125 to 500 ppb Zn resulted in decreasing growth and increasing incidence of abnormality and larval mortality. A second trial with zinc sulfate showed 50 ppb Zn to have little effect on larval development, a progressive decrease in growth at 100 and 150 ppb, and no growth at 200 ppb. It is suggested that the deleterious effect of short-term exposure to zinc may well have contributed to the intermittent failure of larvae and irregular productivity recorded at the hatchery. It is also possible that zinc contamination in estuaries may affect natural oyster breeding, and may have to be considered in the future siting of hatcheries for seed production. (Little-Battelle)
W73-12118

SILICON AND THE ECOLOGY OF MARINE PLANKTON DIATOMS. I. THALASSIOSIRA PSEUDONANA (CYCLOTELLA NANA) GROWN IN A CHEMOSTAT WITH SILICATE AS LIMITING NUTRIENT,
Oslo Univ. (Norway). Dept. of Limnology.
E. Paasche.
Marine Biology, Vol 19, No 2, p 117-126, March 1973. 5 fig, 3 tab, 39 ref.

Descriptors: *Cultures, *Limiting factors, *Growth rates, *Silicates, *Cytological studies, Diatoms, Bioassay, Nutrients, Silica, Absorption, Phytoplankton, Marine algae.
Identifiers: *Chemostat, *Thalassiosira pseudonana, Culture media.

Polycarbonate Erlenmeyer flasks fitted with input and output tubes were used as chemostats for culturing Thalassiosira pseudonana. The flasks were rocked ro allow regular addition and removal of medium and diatoms. Effluent from the flasks was used as the samples for making counts and for analysis of silica content of diatoms. Silica in diatom shells was determined by a modified method of Werner (1966); cell concentrations were estimated by a combination of electronic particle counting and microscopic examination. The calculated maximum growth rates were comparable to those previously reported for this species. The silica content of the diatom shells varied with the growth rate. As the growth rate approached zero, there were still measurable quantities of residual reactive silicate in the medium. In one of the two chemostats used, silicate assimilation by the cells was inefficient due to some unknown internal or external factor. In the other chemostat, statistically calculated half-saturation constants of growth were in the range of 0.5 to 0.8 microgram-at Si/1. Half-saturation constants of steady-state mean silicate uptake per cell and hour, calculated in a similar fashion, were in the range of 1.4 to 2.6 micorgram-at Si/1. These results indicate that the silicate concentrations causing a reduced silicate uptake by this species in nature do not necessarily result in a corresponding reduced growth rate. Growth in coastal waters is likely to become seriously limited by a shortage of silicate only when most of the silicate originally present has been removed in the course of a diatom bloom. (Little-Battelle)
W73-12119

EFFECTS OF PESTICIDES ON BLUE-GREEN ALGAE,
Central Rice Research Inst., Cuttack (India). Dept. of Blue-Green Algae.
P. K. Singh.
Archiv fur Mikrobiologie, Vol 89, No 4, p 317-320, February 21, 1973. 1 tab, 7 ref.

Descriptors: *Cyanophyta, *Pesticide toxicity, *Aquatic algae, *Chlorinated hydrocarbon pesticides, *Phosphothioate pesticides, Insecticides, Water pollution effects, Plant growth, Resistance, Organophosphorus pesticides, Diazinon, Endrin, Laboratory tests.
Identifiers: Algal growth, Aulosira fertilissima, Plectonema boryanum, Cylindrospermum, Lindane, BHC, Benzene hexachloride.

A study was conducted to determine the effect of pesticides on the nitrogen-fixing blue-green algae Cylindrospermum sp., Aulosira fertilissima and the aerobic non-nitrogen-fixer, Plectonema boryanum strain 594. Commercial (Indian) pesticide preparations in granular form were used: 5 percent BHC, lindane, diazinon, and 2 percent endrin. Growth was measured in terms of percentage transmittance of suspended cultures and acetone-extracted pigment measured with a photoelectric colorimeter. Cylindrospermum sp. survived up to 10, 80, 300 and 600 micrograms/ml of BHC, lindane, diazinon and endrin, respectively, with little experimental variations. Tolerance of pesticides was almost similar in nitrogen-free and nitrate-containing medium. The number of cells decreased as the concentrations of BHC increased. A. fertilissima showed growth up to 50 micrograms/ml of BHC. Higher concentrations of this pesticide were lethal. Growth of alga was observed in 200, 400 and 500 micrograms/ml of lindane, diazinon and endrin. Its tolerance was similar in nitrogen-free and nitrate-containing medium. P. boryanum grew up to 30 microgrmas/ml of BHC. There was not much inhibition of growth in 200, 400, and 600 micrograms/ml of lindane, diazinon and endrin. There was no growth of algae in presence of any concentrations of pesticides in nitrogen-free medium. A. fertilissima and P. boryanum were comparatively more resistant than Cylindrospermum ps. (Holoman-Battelle)
W73-12128

EFFECT OF NITRATE, AMMONIA AND NITROGEN STARVATION ON THE REGULATION OF NITRATE REDUCTASE IN CYANIDIUM CALDARIUM,
Naples Univ. (Italy). Istituto di Botanica.
C. Rigano, and U. Violante.
Archiv fur Mikrobiologie, Vol 90, No 1, p 27-33, March 2, 1973. 1 fig, 2 tab, 19 ref.

Descriptors: *Deficient elements, *Nutrient requirements, *Limiting factors, Nitrates, Ammonia, Nitrogen, Cyanophyta, Enzymes, Cultures, Reduction (Chemical), Chemical reactions, Biochemistry, Assay, Nitrites.
Identifiers: *Cyanidium caldarium, *Nitrate reductase, *Biosynthesis, *Enzymatic inhibitors, Substrate utilization, Culture media, Ammonium, Ammonium ions.

Cells of Cyanidium caldarium grown with ammonia or ammonium nitrate as nitrogen source do not contain appreciable nitrate reductase activity. The alga develops the capacity to synthesize the enzyme when it is transferred from the ammonium medium to a nitrogen-free medium. Nitrate is not needed as an inducer and no enhancement in the rate of enzyme synthesis is observed when it is present. By contrast, whereas the synthesis of the enzyme in nitrogen-free medium proceeds at an increasing rate, in the nitrate medium it attains a stationary level after a short time. Nitrate grown cells possess variable amounts of inactive nitrate reductase (from 9 to 60 percent) whereas in nitrogen-free medium the enzyme occurs principally in a fully active form. Addition of ammonia inactivates reversibly the preexisting enzyme. The inactive enzyme is measurable in the crude extract after activation by heating. It is suggested that in Cyanidium the inactivating effect of ammonia, which is the end product of nitrate reduction, in association with the repression of enzyme controls the level of nitrate reductase activity. (Holoman-Battelle)
W73-12130

STUDIES ON FACTORS AFFECTING SURVIVAL OF NILE FISH IN THE SUDAN. I. THE EFFECT OF HYDROGEN ION CONCENTRATION,
Ministry of Natural Resources and Rural Development, Khartoum (Sudan). Fisheries Research Div.
M. A. Mahdi.
Marine Biology, Vol 18, No 2, p 89-92, January 1973. 1 tab, 53 ref.

Descriptors: *Hydrogen ion concentration, *Water pollution effects, *Bioassay, Cichlids, Freshwater fish, Lethal limit, Alkaline water, Acidic water, Mortality, Laboratory tests, Warm-water fish.
Identifiers: *Tilapia nilotica, *Nile fish, Median tolerance limit, Survival.

Young of Tilapia nilotica L. were subjected to acidic and alkaline media of different pH over 24-hr periods. Dilute hydrochloric acid was used to lower the hydrogen ion concentration of the test medium. A pH lower than 2.9 resulted in immediate mortality, whereas a pH of 3.5 and above produced no mortality. Alkaline media had no serious effect on survival. (See also W73-12132 and W73-12133) (Holoman-Battelle)
W73-12131

STUDIES ON FACTORS AFFECTING SURVIVAL OF NILE FISH IN THE SUDAN. II. THE EFFECT OF TEMPERATURE,
Ministry of Natural Resources and Rural Development, Khartoum (Sudan). Fisheries Research Div.
M. A. Mahdi.
Marine Biology, Vol 18, No 2, p 93-95, January 1973. 1 fig, 2 tab, 17 ref.

Descriptors: *Water temperature, *Water pollution effects, *Thermal stress, *Bioassay, Cichlids, Freshwater fish, Mortality, Lethal limit, Laboratory tests, Warm-water fish.
Identifiers: *Nile fish, *Tilapia nilotica, Survival, Median tolerance limit.

When Tilapia nilotica L. was exposed to different temperatures for 24-hr periods, scattered death points were obtaind between 36 and 40 C. Presumably other factors beside temperature affect mortality rate. The median tolerance limit (TLM) over 24 hr was 37.6 C. This temperature is higher than summer Nile water temperatures. (See also W73-12131) (Holoman-Battelle)
W73-12132

STUDIES ON FACTORS AFFECTING SURVIVAL OF NILE FISH IN THE SUDAN. III. THE EFFECT OF OXYGEN,
Ministry of Natural Resources and Rural Development, Khartoum (Sudan). Fisheries Research Div.
M. A. Mahdi.
Marine Biology, Vol 18, No 2, p 96-98, January 1973. 2 fig, 1 tab, 17 ref.

Descriptors: *Dissolved oxygen, *Bioassay, *Water pollution effects, Oxygen sag, Oxygen requirements, Cichlids, Freshwater fish, Lethal limit, Laboratory tests, Mortality, Warm-water fish.
Identifiers: *Tilapia nilotica, *Nile fish, Survival, Median tolerance limit.

Tilapia nilotica L. were exposed to different levels of ambient oxygen concentrations for 24-hr periods. Nitrogen was bubbled through the water to reduce the oxygen concentration to the respective test level. When testing concentrations of oxygen between 2.5 and 0.4 ppm over 24-hr periods of exposure, the median tolerance limits (TLM) over 24 hr were attained at 1.41 ppm of oxygen. (See also W73-12131) (Holoman-Battelle)
W73-12133

SITES OF NUTRIENT ABSORPTION IN AQUATIC MACROPHYTES,
Makerere Univ., Kampala (Uganda). Dept. of Botany.
P. Denny.
Journal of Ecology, Vol 60, No 3, p 819-829, November 1972. 3 fig, 3 tab, 29 ref.

Descriptors: *Bioassay, *Absorption, *Nutrients, *Rooted aquatic plants, *Submerged plants, Growth rates, Aquatic plants, Sediments, Mud, Sands, Pondweeds, Aquatic weeds, Grasses.
Identifiers: Potamogeton schweinfurthii, Potamogeton thunbergii, Potamogeton bunyonyiensis, Ceratophyllum demersum, Hydrilla verticillata, Vallisneria aethiopica, Hornwort, Eel grass, Coontail.

Six taxa of floating-leaved and submerged-leaved water plants (Potamogeton schweinfurthii, Potamogeton thunbergii, Potamogeton bunyonyiensis, Ceratophyllum demersum, Hydrilla verticillata, and Vallisneria aethiopica) were planted in artificial ponds in Kampala, Uganda. The substratum was divided into nutrient-rich mud and nutrient-poor sand sections, but the waters were homogeneously mesotrophic. The plants were harvested from 8 to 15 weeks after planting. Growth rates, in mg dry weight/plant/day, were calculated for roots and shoots. The growth rate of the totally submerged rootless species, C. demersum, was least affected by substratum while the floating-leaved, rooted species, P. thunbergii, showed a four-fold increase on mud. This was reflected in ratios of growth rates of root/shoot of the rooted taxa. The ratios were higher when plants were grown in washed sand, but P. Schweinfurthii, a submerged speices, showed only a small increase whereas P. thunbergii had a nine-fold greater root/shoot growth rate ratio on sand than on mud. It is concluded that nutrients may enter through roots and shoots, but in some circumstances entry may be through roots or shoots alone. (Little-Battelle)
W73-12134

THE LIFE HISTORY OF THE ALDERFLY, SIALIS AEQUALIS BANKS, IN AN ACID MINE STREAM,
Marshall Univ., Huntington, W. Va. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05A.
W73-12136

ON THE PHOTODECOMPOSITION OF CHLOROPHYLL IN VITRO,
California Univ., Berkeley. Dept. of Nutritional Sciences.
M. M. Morris, Y. Park, and G. Mackinney.
Journal of Agricultural and Food Chemistry, Vol 21, No 2, p 277-279, March/April 1973. 6 ref.

Descriptors: *Chlorophyll, *Solar radiation, *Laboratory tests, Plant pigments, Degradation (Decomposition), Fluorescence, Irradiation, Turbidity, Niteogen, Magnesium, Solvent extractions, Distillation.
Identifiers: *Photodecomposition, *Photooxidation, Phytol, Sample preparation, Atomic absorption spectrophotometry, Saponification, Gas liquid chromatography, Organic solvents, Kjeldahl procedure.

Chlorophyll solutions can be irradiated to yield variable amounts of reddish intermediates and a virtually colorless supernatant. Precipitated after brief irradiation, the red intermediates retain a

nitrogen-phytol-magnesium ration of 4:1:1. After longer exposures, the nitrogen-magnesium ratio remains unchanged but the phytol is lost. The supernatant is evaporated to dryness and the residue is extracted successively with petroleumether, water and acetone. The petroleum ether extract is colorless with a weak blue fluorescence. It contains a phytyl ester and 10 to 15 percent of the original nitrogen. The water extract exhibits a whitish turbidity and a strong blue fluorescence. It contains a substantial fraction of the original nitrogen and magnesium. The original supernatant has negligible absorbance in the visible, but some reddish precipitate is formed on concentration. This is soluble in acetone and is devoid of phytol. (Holoman-Battelle)
W73-12146

MICROBIOLOGICAL QUALITY OF SURFACE DRAINAGE WATER FROM THREE SMALL IRRIGATED WATERSHEDS IN SOUTHERN IDAHO,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
J. H. Smith, and C. L. Douglas.
Journal of Environmental Quality, Vol 2, No 1, p 110-112, January-March 1973. 2 tab, 8 ref.

Descriptors: *Water quality, *Irrigation effects, *Coliforms, *Enteric bacteria, Water analysis, Water pollution effects, Irrigation water, Water pollution, Streptococcus, Pathogenic bacteria, Filtration, Separation techniques, Pollutant identification, Surface runoff, Idaho, Dissolved oxygen, Biochemical oxygen demand, Water temperature.
Identifiers: *Fecal streptococci, *Fecal coliforms, Most probable number test, Standard methods.

Irrigation water applied to and leaving three small watersheds in southern Idaho was analyzed to determine the influence of surface irrigation on bacteriological quality of surface runoff water. The sites were inhabited by families raising various crops and some livestock. Presumptive, confirmed, and completed coliform counts were made according to Standard Methods, MPN's were calculated, fecal coliform counts were made by MPN analyses, and fecal streptococci were determined by micropore filtrations. DO, BOD, and water temperatures were also determined. The irrigation water samples were polluted with microorganisms associated with human and animal wastes, as indicated by numbers of coliforms and by fecal coliform/fecal streptococci ratios. There was a trend toward increasing numbers of coliforms and fecal coliforms in the drainage water compared to the irrigation water, but the differences were generally within the confidence limits for MPN analyses. On two of the three watersheds, microorganisms incubated on plating agar at 20C had higher counts in the drainage than in the irrigation water. Fecal streptococci numbers were significantly higher in the drainage than in the irrigation water on two of the three small watersheds. Even though microorganisms counts tend to be higher in drainage than in the irrigation water on these three small watersheds, irrigation use has a minimal deleterious effect on the microbiology of these waters. (Little-Battelle)
W73-12151

COOLING TOWERS AND WATER QUALITY,
Central Electricity Generating Board, London (England). Research Dept.
F. F. Ross, and J. W. Whitehouse.
Water Research, Vol 7, No 4, p 623-631, April 1973. 2 tab, 8 ref.

Descriptors: *Cooling towers, *Water quality, *Thermal powerplants, Oxygenation, Water purification, Dissolved oxygen, Saturation, Cooling water, Slime, Water quality control, Benthic fauna, Biochemical oxygen demand, Oligochaetes, Crustaceans, Isopods, Amphipoda, Waterfleas, Copepods, Insects, Diptera, Dragonflies, Mollusks, Gastropods, Fish, Snails, Tubificids, Midges, Perches, Sticklebacks, Hydroelectric plants.
Identifiers: Limnodrilus hoffmeisteri, Tubifex tubifex, Asellus aquaticus, Gammarus spp, Simocephalus, Bosmina coregoni var. lilljeborgi, Ilyocryptus, Alona rectangula, Rhynochotalona rostrata, Pleuroxus spp, Chydorus sphaericus, Heterocypris incongruens, Cypridopis vidua, Limnocythere, Cyclops bicuspidatus, Eucyclops agilis, Ischnura elegans, Physa acuta, Lymnaea pereger, Hydrobia jenkinsi, Gasterosterus aculeatus, Perca fluviatilis, Pleuronectes flexus, Ostracods, Pouch snails, Pond snails, Three spined stickleback.

Where direct use of water for thermal power plant cooling is possible without harm to benthic organisms, cooling towers are contra-indicated. Where stream flow is inadequate for direct cooling and cooling towers are necessary, they can effect a significant quality improvement in polluted water. Organisms which gain access to and colonize the tower ponds appear to be instrumental in reducing the rate of accumulation of humus sludge. (Holoman-Battelle)
W73-12155

ASPECTS OF THE BIOLOGY OF THE LUMBRICIDS EISENIELLA TETRAEDRA (SAVIGNY) AND DENDROBAENA RUBIDA (SAVIGNY) F. SUBRUBICUNDA (EISEN) IN A PERCOLATING FILTER,
Water Pollution Research Lab., Stevenage (England).
J. F. D. G. Solbe.
J Appl Ecol. Vol 8, No 3, p 845-867. 1971. Illus.
Identifiers: Biology, Dendrobaena-Rubida-Subrubicunda, Eiseniella-Tetraedra, *Filters (Percolating), *Lumbricids, *Sewage purification, Invertebrates.

The development of populations of these lumbricids is described and compared. Oxygen consumption, ammonia excretion, the average feeding rate and assimilative efficiency are calculated. The contributions of macro-invertebrate respiration in sewage purification and other benefits are discussed.–Copyright 1972, Biological Abstracts, Inc.
W73-12175

MERCURY LEVELS IN MARINE BIOTA,
Hawaii Univ., Honolulu.
H. Klemmer, and S. N. Luoma.
Quality of Coastal Waters, Project Bulletin No 6, January 1973. 2 p, 1 fig, 1 tab.

Descriptors: *Mercury, *Water pollution sources, *Fish toxins, *Marine biology, *Path of pollutants, Hawaii, Public health, Water pollution, Fish, Fish diets, Posions, Fish management, Marine animals, Pollutant identification, Food chains.

As part of the quality of coastal water project, recent studies of mercury levels in a wide range of biota collected from a nearshore area on Kauai, Hawaii, indicate that benthic feeders show a greater ability to accumulate mercury than animals feeding above the sediment-water interface. Moreover, the study suggests that, contrary to traditional assumptions, the most effective pathway of mercury transport may not be through a linear food-chain from plankton to herbivore to carnivore, but that greater concentrations of mercury may be found in organisms associated with short food chains linked directly to the benthos. In deeper Hawaiian waters, the pelagic carnivores, marlin, tuna, and mahimahi, appears to contain appreciably higher levels of total mercury than five nearshore species of fish, as indicated by measurements made recently and summarized in a table which accompanies the report. (Mockler-Florida)
W73-12195

ENVIRONMENTAL STATEMENT, RIO BLANCO GAS STIMULATION PROJECT, RIO BLANCO COUNTY, COLORADO.
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-12258

UPTAKE OF MERCURY BY PLANTS AND ITS DISTRIBUTION IN LIVING ORGANISMS IN AN ENVIRONMENT WITH INCREASED CONCENTRATION OF THIS ELEMENT,
Ljubljana Univ. (Yugoslavia).
L. Kosta, A. R. Byrne, P. Stegnar, and V. Zelenko.
Available from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016; $6.00 for proceedings. In: Radiotracer Studies of Chemical Residues in Food and Agriculture, International Atomic Energy Agency, Vienna, p 47-59, 1972, 2 fig, 6 tab, 3 ref.

Descriptors: *Mercury, *Vegetation, *Absorption, *Public health, Industrial wastes, Organic compounds, Analytical techniques, Gas chromatography, Food chains, Animal metabolism, Freshwater fish, Path of pollutants, Environmental effects, Fish diets, Water pollution effects, Toxicity.

Study of the area around the Mercury mine at Idrija was extended to include analysis for methyl Hg. The ratio of methyl Hg/total Hg in fish increased distance downstream from the mine, approaching 1 at a distance of 35 km. Hg and other elements were measured in vegetation, and Hg uptake by rabbits from vegetation. In rabbits, Hg was checked regularly in blood, urine, and feces. The analytical technique was based on reaction of methyl Hg cyanide vapor with either cysteine or glutathione, extraction into benzene, and gas chromatography. The sensitivity was 1 ppb using 0.1-1 g samples. (Bopp-ORNL)
W73-12262

SOME REMARKS ON MERCURY AS AN AQUATIC POLLUTANT AND ITS IMPLICATIONS,
Helsinki Univ. (Finland). Dept. of Radiochemistry
J. K. Miettinen.
Available from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016; $6.00 for proceedings. In: Radiotracer Studies of Chemical Residues in Food and Agriculture, International Atomic Energy Agency, Vienna, p 61-68, 1972, 1 fig, 32 ref.

Descriptors: *Mercury, *Public health, *Fish diets, *Water pollution effects, Reviews, Sediments, Organic compounds, Metabolism, Bacteria, Freshwater fish, Toxicity, Commercial fish, Marine fish, Reviews.

This review of 1970-71 literature includes occurrence of mercury in water, sediments, and marine fish; safe levels for fish in the diet; metabolism of methyl Hg; microbial methylation of Hg in sediments; and evalaution of the risk to populations. Dimethyl Hg (14% of the total Hg) volatilized when dredged sediment was exposed to air. Microbial methylation of Hg in sediments is possibly a detoxification mechanism of the organism, is slow, and requires oxygen. Freshwater fish contain 5-10 ppm in several areas of the USA, 1-5 ppm in 50 other areas. Swordfish exceed the 0.5-ppm limit. (Bopp-ORNL)
W73-12263

SIGNIFICANCE OF MERCURY IN THE ENVIRONMENT: SUGGESTIONS FOR FURTHER RESEARCH,
Department of Agriculture, Saskatoon (Saskatchewan).
J. G. Saha.
Available from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016; $6.00 for proceedings. In: Radiotracer Studies of Chemical Residues in Food and Agriculture, International Atomic Energy Agency, Vienna, p 81-86. 1972.

Descriptors: *Mercury, *Environmental effects, *Public health, *Water pollution effects, Toxicity, Water pollution sources, Absorption, Fish, Path of pollutants, Sediments, Fossil fuels, Air pollution, Precipitation (Atmospheric), Metabolism, Biochemistry, Organic compounds, Analytical techniques, Radioactivity techniques, Food chains, Fish diets.

Problems include: (1) More-extensive measurements and more reliable analytical techniques; (2) extent of the contribution of burning of fossil fuels to the Hg received by the earth's surface in rainfall; (3) environmental factors affecting the formation of highly toxic methyl Hg from other forms; (4) sources of Hg pollution of water and their relative importance; and (5) the biochemistry of methyl Hg poisoning and its treatment. The dangerous Hg level in blood is about 2000 ng/g; the level in about 80% of people without occupational exposure, less than 5 ng/g. Instances of local environmental poisoning include consumption of fish (which may show 3000 times the concentration of the surrounding water), and of seed grain treated with mercurials. (Bopp-ORNL)
W73-12265

SOME CONSERVATIONAL PROBLEMS POSED BY HYDROELECTRIC POWER INSTALLATIONS IN ALBERTA,
Department of Lands and Forests, Lethbridge (Alberta).
D. S. Radford, and R. Hartland-Rowe.
Biol Conserv. Vol 4, No 3, p 166-168. 1972. Illus.
Identifiers: *Benthic invertebrates, *Canada (Alberta), Conservation, *Hydro-electric powerplants, Installations, Invertebrates, Power, Recreation, *Kananaskis River (Alberta).

The regulation of flow of the Kananaskis River, Alberta, for hydroelectric purposes, results in unusually low standing crops of benthic invertebrates and in usually high rates of drift of such organisms. Although the regulation of flow offers various benefits, including protection from spring floods, dilution of pollutants, and the provision of electric power for peak demand periods, the recreational and ecological impairment of the environment is considerable and should be taken into account in planning future hydroelectric developments.--Copyright 1972, Biological Abstracts, Inc.
W73-12268

STATE UNIVERSITY OF NEW YORK, COLLEGE AT PLATTSBURGH, LAKES AND RIVERS RESEARCH LABORATORY 1972 TECHNICAL REPORT.
For primary bibliographic entry see Field 05B.
W73-12321

TOXICITY OF LEAD NITRATE TO FIVE SPECIES OF FRESHWATER ALGAE,
State Univ. Coll., Plattsburgh, N.Y. Miner Inst. of Man and His Environment.
J. L. Malanchuk, and G. K. Greundling.
In: State University of New York Lakes and Rivers Research Laboratory 1972, Technical Report, p 1-24, February 1973. 6 fig, 2 tab, 20 ref.

Descriptors: *Algae, *Lakes, *Lead, Poisons, Water pollution effects, *Toxicity, Nutrients, Carbon radioisotopes, Carbon dioxide, Primary productivity.
Identifiers: Carbon fixation.

Toxicity of Pb (NO3)2 to five species of algae was measured. Portions of unialgal cultures were inoculated into low salt medium and were used to test all species at 10, 20, and 30 ppm Pb. This medium approximated the salt concentrations of natural aquatic environments. Three different cell weights were used for each concentration of lead and for the control to determine a relationship between cell weight and toxicity. The concentration of lead causing a 50% reduction of C-14 fixation as compared to the control was called the ED-50. The ED-50 for three of the species tested (Anabaena, Chlamydomonas, and Navicula) was between 15 and 18 ppm Pb. A desmid, Cosmarium, had an ED-50 of 5 ppm. This species has a higher surface:volume ratio than the other species tested which accounts for its increased sensitivity. Throughout the experiments the fixation of C-14 increased with increasing Pb concentrations. (See also W73-12321) (Knapp-USGS)
W73-12322

ON THE WATER QUALITY OF LAKE BIWA-KO AND THE INHABITABILITY OF THE BIVALVE, CORBICULA SANDAI, IN THE SETA RIVER, (IN JAPANESE),
Shiga Univ., Otsu (Japan). Faculty of Education.
O. Itasaka, M. Sugita, Y. Okumura, and T. Hori.
Mem Fac Educ Shiga Univ Nat Sci. 20, p 18-34. 1970. Illus. English summary.
Identifiers: *Bivalves, *Corbicula-Sandai, Inhabitability, *Japan (Lake Biwa-Ko), Lakes, Minerals, Rivers, Water quality, Seta River (Japan).

The water quality of both Lake Biwa-ko and the Seta River was investigated 3 times during July to Sept. of 1970. Items for the observation were water temperature, pH, dissolved O2, KMnO4 consumption, total-N, NH3-N, NO2-N, NO3-N, SiO2, total-P, PO4-P and transparency. The present investigation showed that the southern part of the lake was transformed into a eutrophic state in a few years. The survey of bivalve distribution in the Seta River has been continued since 1960. The population density during the decade has decreased to about 0.1.--Copyright 1972, Biological Abstract, Inc.
W73-12344

5D. Waste Treatment Processes

WATER REUSE, A BIBLIOGRAPHY, VOLUME 1.
Office of Water Resources Research, Washington, D.C.

Available from the National Technical Information Service as PB-221 998, $6.00 paper copy, $1.45 in microfiche. Water Resources Scientific Information Center Report WRSIC 73-215. June 1973, 394 p.

Descriptors: *Artificial recharge, *Desalination, Filtration, Groundwater, Industrial wastes, Ion exchange, *Irrigation water, Municipal wastes, Pollution abatement, Potable water, Recirculated water, *Reclaimed water, Return flow, *Reverse osmosis, *Sewage treatment, *Tertiary treatment, Waste disposal, *Waste water treatment, Water conservation, Water purification, Water quality, *Water treatment.

This report, containing 263 abstracts, is another in a series of planned bibliographies in water resources to be produced from the information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 53,230 abstracts covering SWRA through February 15, 1973 (Volume 6, Number 4). This volume includes abstracts of documents published through 1969. Author and subject indexes are included. (See also W73-11702).
W73-11701

WATER REUSE, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Resources Research, Washington, D.C.

Available from the National Technical Information Service as PB-221 999, $6.00 paper copy, $1.45 in microfiche. Water Resources Scientific Information Center Report WRSIC 73-215. June 1973. 508 p.

Descriptors: *Artificial recharge, Cooling towers, *Desalination, Heated water, *Industrial wastes, Irrigation, Municipal wastes, Pulp wastes, *Reclaimed water, *Sewage treatment, *Tertiary treatment, *Waste water treatment, Water quality, *Water treatment, Water conservation.

This report, containing 342 abstracts, is another in a series of planned bibliographies in water resources to be produced from the information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 53,230 abstracts covering SWRA through February 15, 1973 (Volume 6, Number 4). This volume includes abstracts of documents published in 1970-1972. Author and subject indexes are included. (See also W73-11701).
W73-11702

KINETICS OF MICROBIALLY MEDIATED METHYLATION OF MERCURY IN AEROBIC AND ANAEROBIC AQUATIC ENVIRONMENTS,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
For primary bibliographic entry see Field 05B.
W73-11711

HYDROGYNAMIC FLUX CONTROL FOR WASTE WATER APPLICATION OF HYPERFILTRATION SYSTEMS,
Oak Ridge National Lab., Tenn.
D. G. Thomas, and R. B. Gallaher.
Copy available from GPO Sup Doc as EP1.23/2: 73-228, $1.25; microfiche from NTIS as PB-222 005, $1.45. Environmental Protection Technology Series Report No EPA-R2-73-228, May 1973. 80 p, 28 fig, 10 tab, 22 ref. EPA Project 17020-FEV. 14-12-896.

Descriptors: Fouling, *Hydrodynamics, Control, Velocity, Filtration, Reverse osmosis, Waste water treatment.
Identifiers: Particulates, Flux control, Flux decline, Hyperfiltration.

The effect of hydrogynamics on flux decline of cellulose acetate hyperfiltration membranes was studied using primary effluent from the Oak Ridge East Sewage Plant as feed. The system contained multiple, annular-geometry housings which could be operated simultaneously at different velocities with the same feed. The range of fluxes studied was from 2 to 150 gal./ft2 day and axial velocities ranged from 3 to 30 ft/sec. System pressure was 600 psig. The results demonatrate that there is a threshold velocity above which flux decline is markedly smaller than at lower velocities. Visual inspection of the membranes after a test indicates that operation above the threshold velocity markedly reduces accumulation of solids during the first 200-300 hours of a test. In scouting studies addition of a flocculant appeared to markedly reduce the threshold velocity. During the initial 200-300 hours of those tests with primary sewage effluent as feed and in which the axial velocity was above the threshold velocity, the flux decline parameter, b, (b ± - (delta log flux)/ (delta log time)) was directly proportional to the six-tenths power of the flux and inversely proportional to the square root of the velocity. (EPA)
W73-11713

ANAEROBIC-AEROBIC TREATMENT OF TEXTILE WASTES WITH ACTIVATED CARBON,
Palisades Industries, Inc., Peace Dale, R.I.
C. P. C. Poon, and P. P. Virgadamo.
Copy available from GPO Sup Doc as EP1.23/2: 73-248, $2.85, microfiche from NTIS as PB-221

985, $1.45. Environmental Protection Technology Series Report No EPA-R2-73-248, May 1973. EPA Project 12090 EQO.

Descriptors: *Waste water treatment, *Industrial wastes, *Textiles, *Activated carbon, Adsorption, *Biochemical oxygen demand, *Chemical oxygen demand, Pilot plants, Industrial wastes.
Identifiers: *Total organic carbon.

The operation of an anaerobic-aerobic bio-oxidation treatment system utilizing activated carbon was studied for 24 months at Palisades Industries, Peace Dale, Rhode Island. Biological oxidation and conversion of soluble organic waste constituents took place in the aerated basin operated as a mixed dispersed growth reactor without return sludge. Washed out solids from the aeration basin were filtered by a parallel set of activated carbon columns. The entrapped solids were then hydrolized when these columns were regenerated in place anaerobically. A second parallel set of carbon columns provided for additional removal of solids and soluble organics. However, the biological regeneration in these columns was carried out aerobically. Both the laboratory and the large scale piolot plant experiments revealed (1) good color removal; (2) oxidation of organic chemicals fed to the system; (3) major reduction in BOD and COD in the waste effluent stream; and (4) continued biological regeneration of the activated carbon; and (5) high degree of removal of suspended solids without conventional equipment. This study has demonstrated that waste streams from a typical cloth dyeing and finishing operation can be effectively treated using activated carbon coupled with biological regeneration. The advantages to this system are a result of the catalytic effect rendered by the activated carbon on difficult to degrade organic molecules and the small space requirements in respect to conventional treatment systems for an equivalent degree of treatment. (EPA)
W73-11715

ORANGE COUNTY WATER DISTRICT'S WATER FACTORY 21,
Orange County Water District, Santa Ana, Calif.
J. R. Cofer.
J Irrig Drain Div, Am Soc Civ Eng, Vol 98, No IR4, p 553-567, Dec 1972. 7 fig, 3 tab.

Descriptors: *Water reuse, *Desalination, *Groundwater recharge, Waste water treatment, Water treatment, Sanitary engineering, Water management (Applied), Desalination plants, Desalination processes, Environmental effects, Injection wells, Groundwater, Costs, *California.
Identifiers: Orange County (Calif), Vertical tube unit, Waste water use, Multistage flash distillation, Salt water barriers.

An advanced design fresh water factory is being constructed in Orange County, California. The factory consists of waste water reclamation plant and sea water desalting module to supply fresh water to a 30 mgd sea water barrier ground water basin replenishment system. The paper describes the advanced waste water reclamation plant and sea water desalting plant being implemented by the Orange County Water District, and the utilization of the product water from the 2 plants in the ground water injection program. The waste water reclamation process includes: lime coagulation, ammonia stripping, recarbonation, mixed media filtration, activated carbon adsorption, chlorination, and blending. The sea water desalting plant will use the vertical tube evaporation multistage flash process. Use of waste heat from the desalting plant in the reclamation process, and the resolution of adverse environmental impacts are analyzed; long-range implications of the fresh water factory in the management of the ground water basin are postulated. (USBR)
W73-11719

THE ALUMINA-LIME SODA WATER TREATMENT PROCESS,
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 03A.
W73-11748

SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
J. M. Sweeten, W. S. Allen, and D. L. Reddell.
Cattle Feeders' Information, Publication No L-1094, (1973), 4 p.

Descriptors: *Solid wastes, *Storage, *Ultimate disposal, Groundwater, Pollutants, Aquifers, *Waste water treatment, Fertilizers, *Feed lots, Cattle, Farm wastes.

Information is presented for commercial cattle feedlots on methods and costs of solid feedlot waste management; equipment selection guidelines; and agronomic effects of applying feedlot manure to cropland. (Lee-East Central)
W73-11766

MANURE SLURRY IRRIGATION SYSTEM RECEIVING LOT RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
J. I. Sewell.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper no. 72-443, 13 p, 7 fig, 5 ref.

Descriptors: *Pollution abatement, Runoff, Groundwater, *Slurries, Irrigation systems, *Cattle, Farm wastes, Waste disposal, Management, Feed lots.

Plans for facilities and system design for a manure slurry irrigation system are presented. This system consisting of a storage tank, chopper-agitator-pump unit, flush pits, irrigation pipe and a large sprinkle performed durably in testing and offered possibilities for improved efficiency in manure management. It created a minimum of pollution problems. The operational plans and system costs are outlined. (Fomby-East Central)
W73-11767

USE OF DUCKWEED FOR WATER TREATMENT AND ANIMAL FEED,
Louisiana State Univ., Baton Rouge. School of Forestry and Wildlife Management.
D. D. Culley, Jr., and E. A. Epps.
Journal Water Pollution Control Federation, Vol 45, No 2, p 337-347, February, 1973. 1 fig, 5 tab, 28 ref.

Descriptors: *Farm wastes, Waste water treatment, Farm lagoons, Nutrient removal, Feeds, Livestock.
Identifiers: *Duckweed, Lemnaceae.

This scientific study was established to search for aquatic plants suitable for nutrient reduction in animal waste lagoons and for utilization in animal feeds. Criteria for evaluating the aquatic plants are given. Chemical composition of plants from the family lemnaceae are shown in tables based on eight test sites. Duckweed shows great potential, but minor problems include toxic buildup and excess water content. (Marquard-East Central)
W73-11769

HOUSED CONFINEMENT - AN ANSWER FOR FEEDING IN NORTHERN CALIFORNIA,
E. W. Manthey.
Feedlot Management, Vol 14, No 2, p 10-16, February, 1972. 6 photos, 1 fig.

Descriptors: *Feed lots, *Waste disposal, *Farm wastes, California, Confinement pens, Cattle.
Identifiers: Cow toilet.

Physical facilities are described and pictured for a housed feedlot that takes advantage of northern California's market and feed supply and overcomes the problem of the wet season. Construction time/cost are cut by new methods of casting concrete slotted floors in place. The pit beneath the lot is scraped continuously by a cable driven blade and disposed of on 160 acre fields by sprinkle irrigation. Rain runoff and overflow of troughs are piped to a pond. (Marquard-East Central)
W73-11770

THE OPCCO DRYER.

Agricultural Engineering, Vol 53, No 6, p 16-17, June, 1972. 2 fig.

Descriptors: *Recycling, Drying, Fertilizers, *Farm wastes, *Waste treatment, Poultry, Feeds.

A solid waste management system, developed and patented by Harvey Wenger and manufactured by Organic Pollution Control Corp., has been placed on several large poultry farms to turn poultry litter into fertilizer or into a feed additive for livestock. Michigan State University's Dr. Howard Zindel and other experts feel that the dryer, used so far primarily with poultry manure, can successfully handle all forms of animal wastes plus packing house offal, vegetable and fruit peel and pulp, and municipal sewage. Requiring an area of about 20-40 feet, the 40 ton per day unit operates on either natural or LP gas. Plans for developing other power supplies are being studied. The drying process is described and a schematic of the flow path is shown. The process is not inexpensive, but it does supply a solution to the waste problem. (Wetherill-East Central)
W73-11771

THE GREAT MANURE DILEMMA,
For primary bibliographic entry see Field 05E.
W73-11773

BEEF CATTLE FEEDLOT RUNOFF, SOLIDS TRANSPORT AND SETTLING CHARACTERISTICS,
Nebraska Univ., Lincoln.
C. B. Gilbertson, J. A. Nienaber, T. M. McCalla, J. R. Ellis, and W. R. Woods.
Transactions of the ASAF (American Society of Agriculture Engineers), Vol 15, No 6, p 1132-1134, 1972, 6 fig, 8 ref. Support in part by EPA.

Descriptors: *Feed lots, Runoff, Continuous flow, *Farm wastes, Cattle, *Waste water treatment.
Identifiers: *Solids removal systems, Batch system.

Removing settleable solids from beef cattle feedlot runoff requires a working knowledge of the relationships between precipitation, runoff, solids, transport, and settling of the transported solids. The authors give physical descriptions of the working area and develop estimating equations which can be used to assist in design of solids removal systems in geographic areas with similar climatic and feedlot conditions. Two systems, a 'batch system', and a 'continuous flow' system, were constructed. In laboratory tests (Imhoff cone tests), about 40% of the total solids transported (by weight) settled in 16 to 18 minutes at zero velocity of flow. Calculated bulk density of settleable solids was 6.71 lb. per cu. ft. with a standard deviation of 3.69 lb. per cu. ft. It was recommended that an open channel should be equipped with barriers to restrict runoff flow to near zero velocity to remove sufficient solids to maintain a satisfactory condition within the holding pond. (Wetherill-East Central)
W73-11774

PERFORMANCE OF BEEF ANIMALS AS AFFECTED BY CROWDING AND THERMAL ENVIRONMENT DURING A FALL-WINTER PERIOD,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
G. W. A. Mahoney, A. F. Butchbaker, and J. I. Fryrear.
Paper presented at 65th Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No, 72-426, 18 p, 5 fig, 1 tab, 6 ref.

Descriptors: Production, Cattle, Windbreaks, *Oxidation lagoons, *Waste water treatment, *Farm wastes, Productivity, Feeds.
Identifiers: Crowding, Slotted floors, Weight gain.

Results of feed trials made in fall-winter periods of 1969-1972 are reported. The objectives of these trials were: (1) Compare production and feed consumption for 3 levels of crowding, (2) Compare production and feed consumption rates for cattle on slotted floors with wind breaks and shades with cattle in open cattle pens, (3) Determine performance of a cattle waste oxidation ditch for fall-winter operation in the Southwest. Corresponding results were: (1) Maximum gains and feed efficiency were obtained at approximately 20-22 square feet per animal. (2) Weight gain of cattle on slotted floors was not significantly greater than those in open pens, (3) Cold weather freezing indicated that enclosure of oxidation ditches might be necessary for their effective use in the Southwest. (Marquard-East Central)
W73-11776

OBSERVATIONS OF DAIRY MANURE HANDLING SYSTEMS,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
D. W. Bates.
Paper presented at 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No 72-413, 3 p.

Descriptors: *Waste disposal, *Waste storage, *Farm wastes, Waste treatment, Cattle, Dairy industry.
Identifiers: Stall barn, Stacking system, Bedding, Solid alleys, Slatted alleys, Liquid manure systems.

Because of the need to reduce labor in handling manure, the cost of bedding, and regulations dealing with the handling and disposition of animal manure, old manure disposal methods are being replaced by new. Various systems for the daily hauling will depend somewhat on whether the farmer has a stall barn or free-stall barn. Slatted or solid alleys, automatic scrapers, and a new manure pump which forces manure from a collection point in the barn through a pipe to an external manure pit for storage and later removal are discussed. Storage capacity is an important facet for dairymen, particularly in the colder regions of the country. Advantages of figuring construction costs prior to building, and disadvantages of 'adding on' are discussed. (Dudley-East Central)
W73-11777

ANOTHER POSSIBLE PROCESS FOR MANURE.

Calf News, Vol 11, No 1, p 38, January, 1973.

Descriptors: Feedlots, Farm wastes, *Waste treatment, Fertilizers, Ammonia.

A theory has been developed for the processing of manure which could produce 1,000 tons of ammonia per day from the manure deposits of around 600,000 cattle. This theory proposes that the manure be partially oxidized in the presence of the correct amount of air so that a synthetic gas is produced in the correct ratios to be used for ammonia production. By this process, the manure would be converted into an easily transported fertilizer which then would go back to the land to insure high crop yields. This process may also prove an answer to the problem of cattle feedlot pollution. (Anderson-East Central)
W73-11780

A LOVELY NEW SCENT FOR MANURE.
Calf News, Vol 9, No 10, p 4. October, 1971.

Descriptors: *Air pollution, *Sagebrush, *Farm wastes, Odor, Water pollution control.

A method of reducing manure odor with a sage brush feed additive has been discovered. This additive, which causes continuous production of volatile oils in manure and urine, seems to improve the health of the cattle with no detectable change in the taste of the beef. Plans for future research include spraying of feedlots with sage oils. The oils can be synthetically produced, but there is an abundance of natural sage. The product is not yet commercially available. (Fomby-East Central)
W73-11783

FIVE FEEDING SYSTEMS COMPARED.
Feedlot Management. p 34-37, January, 1971. 8 fig.

Descriptors: *Feed lots, Performance, Runoff, *Farm wastes, Cattle, Confinement pens.
Identifiers: Animal density, Open lot, Open shed, Cold barn, Warm barn.

Preliminary results are given on the influence of various housing systems on beef cattle and the effect of animal density on feedlot performance. It is indicated that housed confinement should be used to capacity and maintained year round for maximum benefits. Housed confinement tends to control illness and high density does not seem to jeopardize health or feed efficiency. Advantages and disadvantages are given for each type of housing studied. The five types of housing are open lot, open shed, manure pack shed, cold barn and warm barn. All five systems are designed to contain all animal wastes. (East Central)
W73-11784

FEEDERS HEAR WOES OF CONFINEMENT START.

Beef, p 16-17. July, 1971.

Descriptors: Ammonia, Feed lots, Waste storage, *Farm wastes, Oxidation, Proteins, Iowa, *Oxidation lagoons, Waste water treatment, Livestock.

Problems of an oxidation ditch at Iowa State University are described. Because the start-up period was during the winter, ammonia foam resulted. Later, equipment malfunctions, protein foam, and freezing of sewage created problems. How each problem was met, is described. (Marquard-East Central)
W73-11787

FEED 'EM TRASH, CUT POLLUTION.
Beef, p 12. July, 1971.

Descriptors: Cellulose, Brush control, *Farm wastes, *Recycling, Proteins, *Feed lots, Texas, Feeds.

Texas Tech researchers have devised a process that takes paper, manure, brush, or any substance with cellulose and converts it to protein and sugar. The product can be used for animal feed and possibly in the future for human consumption. (Marquard-East Central)
W73-11789

DIRECT OBSERVATION OF REVERSIBLE FORMATION OF ANIONIC SIGMA COMPLEXES RELATED TO TRANSITION STATE ANALOGS FOR ADENOSINE DEAMINASE,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
For primary bibliographic entry see Field 01B.
W73-11852

SEWAGE TREATMENT SYSTEM,
Missouri Engineering Corp., Rolla. (assignee)
R. A. Lemberger, and J. L. Gilmore.
U.S. Patent No 3,724,664, 6 p, 9 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 909, No 1, p 178, April 3, 1973.

Descriptors: *Patents, Equipment, *Sewage treatment, *Aeration, *Waste water treatment, *Water quality control, *Water pollution control, *Pollution abatement.
Identifiers: Settlement, Water pollution prevention.

This system consists of the following items: a below-ground tank for receiving sewage; an effluent sprinkler above ground; a pump with a discharge end; a connection between the pump and sprinkler; and a connection between the tank end and the discharge end of the pump. The tank is divided into a settlement chamber and an aeration chamber. The pump is situated within the aeration chamber. Safety float switches are advantageously placed. A control valve is of a two position character; in one position, effluent is recirculated within the aeration chamber, and in the other position, effluent is discharged through the sprinkler for dispersion. The operation of the control valve and pump is governed by a timer. (Sinha-OEIS)
W73-11872

APPARATUS AND SYSTEM FOR REMOVAL OF LATEX FROM WASTE WATER,
Clarkson Industries, Inc., New York. (assignee)
W. H. Scott, Jr.
U. S. Patent No 3,726,794, 4 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 909, No 2, p 683, April 10, 1973.

Descriptors: *Patents, Equipment, *Waste water treatment, *Chemical reactions, Sludges, *Pollution abatement, *Industrial wastes, *Water quality control, *Water pollution control.
Identifiers: *Chemical treatment, Latex.

Waste water containing latex is led into a mixing compartment where treating chemicals are also deposited. The mixture is moved to a settling tank and then disposed in a polishing tank where other chemicals are added to the mixture. The settled sludge is removed by an endless conveyor. The chemicals to be used are not identified. Details are given on the control and pumping systems. (Sinha-OEIS)
W73-11874

WASTE WATER TREATMENT SYSTEM,
E. T. Armstrong.
U.S. Patent No 3,730,881, 12 p, 12 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 910, No 1, P 289, May 1, 1973.

Descriptors: *Patents, *Waste water treatment, *Sedimentation, Trickling filters, *Activated sludge, *Disinfection, Aerobic conditions, *Biological treatment, *Pollution abatement, *Water quality control, *Water pollution control, Ozone.
Identifiers: Flotation separation, *Water pollution prevention.

This system includes a primary sedimentation tank, a primary bioprocessing tank, and a primary disinfection tank, all of which operate with the influent under aerobic conditions. Means are provided to receive raw waste at the input to the pri-

mary sedimentation tank and pass it throughout the system to the output of the disinfection tank. Explanations are given on the use of microorganisms in waste treatment, the settling or sedimentation process, flotation separation. roughing (trickling filter), bioprocessing second stage activated sludge, system optimization and the characteristic load, the disinfection system, force main injection and on system integration. Structural improvements in settling reduce velocity, inhibit boundary layer separation and act to suppress mixing of the sewage. In the bioprocessing operations, the key is to improve efficiency of the liquid-gas exchange to achieve better oxygen contact. The liquid-gas exchange feature utilizes a high momentum exchange under turbulent flow conditions in a hydraulic pressure gradient. (Sinha-OEIS)
W73-11878

INTERNAL PRECIPITATION OF PHOSPHATE IN SETTLING ZONE,
Biospherics, Inc., Rockville, Md. (assignee)
G. V. Levin, and G. J. Topol.
U.S. Patent No 3,730,882, 3 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 910, No 1, p 289, May 1, 1973.

Descriptors: *Patents, *Sewage treatment, *Biochemical oxygen demand, *Phosphate, Nutrient removal, Microorganisms, *Aeration, *Biological treatment, *Pollution abatement, Activated sludge, *Water pollution control, *Water quality control, *Water resources.
Identifiers: *Water pollution prevention.

A process is described for treating raw or treated sewage to obtain a substantial phosphate-free effluent which is to be disposed in natural water resources. Influent sewage is mixed with activated sludge to provide a mixed liquor. The mixed liquor is passed to an aeration zone to reduce its BOD content. The microorganisms present in that zone take up the phosphate. In the settling zone, phosphate-enriched sludge settles into the anaerobic layer and the phosphate-free effluent is removed from above the layer of sludge. A phosphate precipitant is added to the sludge holding soluble phosphate in the liquid phase thereof to precipitate the water soluble phosphate. There results a mixture of precipitated phosphate particles, sludge organisms that have given up intracellular phosphate and a phosphate-depleted aqueous phase. This mixture is recycled for mixing with influent sewage. One example is cited. (Sinha-OEIS)
W73-11879

SEWAGE DISPOSAL METHOD,
L.A.A. Lefrancois.
U.S. Patent No 3,730,883, 3 p, 1 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 910, No 1, p 289, May 1, 1973.

Descriptors: *Patents, *Waste water treatment, *Agriculture, *Food processing industry, *Fermentation, *Microorganisms, *Aeration, *Pollution abatement, *Water quality control, *Water pollution control.
Identifiers: *Water pollution prevention.

Waste liquid is introduced continuously into a fermentation apparatus in order to preserve throughout the liquid mass a homogeneity of the solid, liquid, and gaseous fraction, and to ensure a maximum dispersion of the microorganisms. Air is blown continuously into the apparatus in order to further ensure the dispersion of the microorganisms. The liquid more or less loaded with organic substances, such as activated sludge, is drawn off continuously from the fermentation apparatus to maintain a constant mass of treated liquid in the apparatus. (Sinha-OEIS)
W73-11880

METHOD OF PURIFYING WATER,
Aktiebolaget Atomenergi, Stockholm (Sweden). (assignee)
For primary bibliographic entry see Field 05F.
W73-11881

METHOD AND APPARATUS FOR DETERMINING OXYGEN CONSUMPTION RATE IN SEWAGE,
Robertshaw Controls Co., Richmond, Va. (assignee)
R. D. Mikesell.
U.S. Patent No 3,731,522, 4 p, 2 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 910, No 2, p 463, May 8, 1973.

Descriptors: *Patents, *Sewage treatment, *Dissolved oxygen, Bacteria, *Waste water treatment, *Oxygenation, Equipment, *Pollution abatement, *Water quality control, *Water pollution control.
Identifiers: *Water pollution prevention.

The continuous respirometer provides an indication of the rate at which oxygen is being consumed by the bacterial population in the sewage. A means for sensing the amount of oxygen in the fluid entering the container is provided as well as a means for sensing the amount of oxygen exhausted at the outlet. A pump is provided for circulating the sewage through the closed container at a constant flow rate so that the amount of dissolved oxygen in the sewage may be determined. The respirometer may be adapted for use in natural water bodies. (Sinha-OEIS)
W73-11883

LIQUID FILTER,
T. M. Walters.
U.S. Patent No 3,731,814, 7 p, 15 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 910, No 2, p 538, May 8, 1973.

Descriptors: *Patents, Filters, *Filtration, Equipment, *Water treatment, *Pollution abatement, *Water pollution control, *Water quality control.
Identifiers: *Water pollution prevention.

The filter uses one or more drum-like inner chambers in which both the cylindrical surface and the flat circular surfaces of an inner chamber are provided with filter screens. The interior of the drum-like inner chamber is provided with washer arms adjacent to all filtration screens in such manner that relative motion of the arms to the drum causes the washer arms to squeeze out or scoop up the liquid within the drum and push this liquid outward through the screens. Trial and error experiments determine the proper rotational speed for the chosen surface area of the screen and the size of the screen mesh. (Sinha-OEIS)
W73-11884

SUBMERGED FILTER-HORIZONTAL FLOW MODE,
Research Corp., New York. (assignee)
J. W. Klock.
U.S. Patent No 3,732,160, 5 p, 3 fig, 5 ref; Official Gazette of the United State Patent Office, Vol 910, No 2, p 621, May 8, 1973.

Descriptors: *Patents, *Waste water treatment, *Filtration, Oxygen, *Aerobic conditions, Equipment, *Pollution abatement, *Sedimentation, *Gravity, Separation techniques, *Water quality control, *Water pollution control.
Identifiers: *Water pollution prevention, *Biochemical treatment.

Waste-containing liquor is biochemically treated in a tank or cell by continuously recirculating it through a filter media which is submerged in the liquor while continuously withdrawing a small portion of the liquor. A pressurized column of oxygen-containing gas entrains and lifts the liquid waste through an unobstructed tube and recirculates it horizontally through the filter media. During the lifting process oxygen from the fluid permeates the waste in order to ensure active aerobic metabolism. The tank may be arranged in series with other similar tanks utilizing horizontal flow through the filter media, or one or more of such tanks may be arranged in combination with one or more tanks having vertical flow through the filter media. In the horizontal mode, the waste is in contact with the culture while moving horizontally through the filter media, thus including waste separation by gravity sedimentation in addition to impact removal. (Sinha-OEIS)
W73-11885

MANAGEMENT OF RECYCLED WASTE--PROCESS WATER PONDS,
Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Engineering Science.
C. E. Renn.
Copy available from GPO Sup Doc as EP1.23/2:73-223, $0.85; microfiche from NTIS as PB-222 060, $1.45. Environmental Protection Technology Series Report EPA-R2-73-223, May 1973. 49 p, 5 fig, 3 tab, 5 ref. EPA Project WPD 117.

Descriptors: *Water reuse, *Biological treatment, *Water purification, *Aerated lagoons, Waste assimilative capacity, Industrial wastes, Waste water treatment, Industries.

Successful operation is described of a storage pond used to collect treated waste waters and runoff for recycle to manufacturing operations under conditions of drought and severe water shortages. Treated sewage and cafeteria wastes are stored in an air sparger mixed pond and are returned to the manufacturing plant to provide water for evaporative cooling and a variety of production processes. By applying long term storage, air sparger agitation, and controlled stratification during the summer, it has been possible to increase the effectiveness of limited well supplies from six to fifteen times. The efficiency of the pond depends in larger part upon biological processes that go on in the comparatively shallow areas of the system. These act to capture phosphorus and to stabilize algal organics generated in the pond itself. (EPA)
W73-11889

NITROGEN REMOVAL FROM WASTE WATER BY BREAKPOINT CHLORINATION,
Environmental Protection Agency, Washington, D.C. (assignee)
T. A. Pressley, and D. F. Bishop, Jr.
U.S. Patent No 3,732,164, 7 p, 4 fig, 2 tab, 8 ref; Official Gazette of the United States Patent Office, Vol 910, No 2, p 622, May 8, 1973.

Descriptors: *Patents, *Waste water treatment, *Nutrient removal, Nitrogen, *Chlorination, Ammonia, *Domestic wastes, *Sewage treatment, Chemical reactions, *Pollution abatement, *Water quality control, *Water pollution control.

A method is described for the removal of bound nitrogen from waste water by the use of breakpoint chlorination. (1) Feeding a stream of waste water having an NH3 - N content of about 8 - 30mg./l. to a mixer-reactor; (2) Feed a stream of chlorine material, selected from the group consisting of an alkali metal hypochlorite and free chlorine, to the mixer-reactor in an amount of about 65 - 300 mg./l. of chlorine to provide a ratio of Cl:NH3 of about 8-10:1; (3) Maintain the pH within the mixer-reactor at a value of about 5.8 to 9.5; (4) Thoroughly mix the streams in the mixer-reactor immediately upon the entrance of the streams to the mixer-reactor so as to provide the pH value of about 5.8 to 9.5 uniform, throughout the reactor and to insure a uniform breakpoint chlorination reaction. (Sinha-OEIS)
W73-11890

ACTIVATED SLUDGE SEWAGE TREATMENT PROCESS AND SYSTEM,
Air Products and Chemicals, Inc., Allentown, Pa. (assignee)
M. L. Spector, R. D. Jones, and C. S. McDowell.
U.S. Patent No 3,733,264, 5 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 910, No 3, p 901, May 15, 1973.

Descriptors: *Patents, *Sewage treatment, *Activated sludge, Aeration, Oxygen, *Pollution abatement, *Water pollution control, *Water quality control, Biochemical oxygen demand.
Identifiers: *Atmospheric air.

This process consists of the following steps: biodegradable waste influent and activated sludge form a mixed liquor which is introduced into a first covered aeration zone; oxygen-rich aeration gas is introduced into this aeration zone; the partially BOD reduced mixed liquor is passed into a subsequent covered aeration zone; a second aeration gas composed of atmospheric air is introduced into the subsequent aeration zone in which the oxygen content is held below 35% by volume until the BOD is reduced to a predetermined level. The system is designed so that between 15 and 95% of the oxygen utilized by the mixed liquor is used in the first aeration zone and the remainder in the second zone. (Sinha-OEIS)
W73-11892

PROCESS FOR COAGULATING AND AGGLOMERATING PARTICULATE MATERIAL WITHIN A LIQUID MEDIA,
J. W. Gooch.
U.S. Patent No 3,733,269, 4 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 910, No 3, p 903, May 15, 1973.

Descriptors: *Patents, *Water treatment, Chemical reactions, *Coagulation, *Centrifugation, Hydrogen sulfide, Organic wastes, Suspended solids, *Waste water treatment, *Filtration, *Water pollution control, *Water purification, Ammonia, Halogens, Carbon dioxide, Ozone, *Industrial wastes, *Food processing industry, *Pulp and paper industry, *Pollution sources, *Pollution abatement, *Water quality control.
Identifiers: *Chemical treatment, Agglomeration, Decanting, Sulfur dioxide.

A reagent solution is released and dispersed within a waste stream in the form of a microscopically gaseous phase which is adsorbed on the surfaces of the suspended solids and organic waste materials to produce surface characteristics which induce agglomeration and coagulation of the solids. These may be removed by decanting, filtration, or centrifugation. Preferred reagents include ammonia, hydrogen sulfide, halogen compounds, carbon dioxide, sulfure dioxide and ozone. Temperatures from 80 to 700C produce suitable results. Seven examples are cited. (Sinha-OEIS)
W73-11894

METHOD AND APPARATUS FOR ECOLOGICAL RECYCLING OF WASTE PRODUCTS TO PRODUCE FERTILIZER AND GARDEN PLANT NUTRIENTS,
C. H. Carothers.
U.S. Patent No 3,728,254, 6 p, 10 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 909, No 3, p 1054, April 17, 1973.

Descriptors: *Patents, *Waste treatment, *Waste water treatment, *Aeration, Equipment, Nutrient removal, *Domestic wastes, *Activated sludge, *Pollution abatement, *Water quality control, Water pollution control, Fertilizers, Nutrients, Waste disposal.
Identifiers: Settlement, *Water poilution prevention.

Urban waste is disposed through the utilization of activated sludge, sanitary sewage treatment plants. Solid wastes are comminuted and then introduced into a flowstream passing through sanitary sewage lines being led into a treatment plant. The combined effluent is introduced into conventional aeration tanks which have been modified to provide supplemental aeration. The combined liquor is then removed to a settling tank. A portion of the activated sludge which settles out is returned to the aeration tank to serve as an aeration catalyst, the remainder is removed for processing to convert it for use as a plant food. The final effluent is substantially nutrient free water which may be discharged without damage to environmental water resources. (Sinha-OEIS)
W73-11895

DOMESTIC SEWAGE TREATMENT PLANT,
Sanitary Disposal Systems, Inc., Wheat Ridge, Colo. (assignee)
J. S. Stone.
U.S. Patent No 3,731,812, 9 p, 7 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 910, No 2, p 538, May 8, 1973.

Descriptors: *Patents, *Waste water treatment, *Domestic wastes, *Sewage treatment, *Tertiary treatment, *Filtration, Filters, *Aeration, *Aerobic treatment, Pollution abatement, Dissolved oxygen, *Water pollution control, *Water quality control.

A tertiary treatment domestic sewage treatment plant effects particle size reduction by hydraulic action, utilizes extended aeration and adiabatic cooling of the surface of the treating bath to enhance oxygen absorption and is provided with a living filter. The filter differs significantly from the conventional trickling filter in that the flow is reversed, the flow passages are considerably smaller and it is completely submerged. The filter is a living mass, composed of aerobic saprophytic bacteria, fungi, algae, protozoa, crustaceae, rotifera and worms. This mass thrives as a natural ecological succession with a controlled environment. Hydraulic displacement from below furnishes food as finely divided suspended, colloidal and dissolved solids. Continuous aeration from below furnishes dissolved oxygen to assure a completely aerobic process. (Sinha-OEIS)
W73-11897

LIQUID FILTERING APPARATUS,
I. Pistiner.
U.S. Patent No 3,722,682, 5 p, 6 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 908, No 4, p 967, March 27, 1973.

Descriptors: *Patents, *Waste water treatment, *Liquid wastes, *Filtration, Filters, *Water treatment, *Water purification, *Pollution abatement, *Water quality control, *Water pollution control.

A self contained liquid filtering apparatus is described. A filtering chamber is provided at the top of an elongated frame structure. This frame structure supports also toggle actuated devices for opening and closing end gates at the open ends of the filtering chamber in order to permit the advancing of a filtering sheet that is taken from a roll supported upon the frame and is drawn by a motorized roller through the end openings of the filtering chamber upon the end gates being lifted by toggle devices. An evacuating apparatus is provided within the frame structure for removing the liquid from the filtering chamber prior to the opening of the end gates and the advancing of the filtering paper from its roll and adapted to return the liquid to the filtering chamber when the new filter area has been provided. The filtered liquid removed from the filtering chamber may be collected in a tank and returned to the filtering chamber so as to be refiltered. Fluid cylinder devices are used for the actuation of the toggle gate operating mechanisms. For the evacuating cylinder device appropriate valves are used in the liquid pipelines to control the flow of the liquid into and out of the filtering chamber. (Sinha-OEIS)
W73-11898

RADIOACTIVE WASTE MANAGEMENT AT HANFORD,
Atlantic Richfield Hanford Co., Richland, Wash.
G. R. Kiel.
Available from NTIS, Springfield, Va., as ARH-SA-113; $4.00 in paper copy, $1.45 in microfiche. Report ARH-SA-113, 1972. 12 p. AEC-AT (45-1)-2130.

Descriptors: *Nuclear wastes, *Waste storage, *Waste disposal, *Washington, Columbia River, Soil properties, Absorption, Ion exchange, Ponding, Waste water disposal, Underground waste disposal, Public health, Seepage, Leakage, Linings, Monitoring.

Efforts are being made to eliminate discharge of radioactivity to soil at Hanford. In the past low-level-liquid waste (process cooling water and laundry waste) was retained in ponds such that the radioisotopes were sorbed by soil beneath the pond. Intermediate-level-liquid waste from chemical reprocessing was largely recycled, but a small part was discharged to long, narrow trenches that were filled with gravel and backfilled with soil. Input was discontinued when ground-water sampling indicated saturation of the soil sorptive capacity. Pending conversion to solid form, high-level waste was stored in underground tanks with leak-detection facilities. (Bopp-ORNL)
W73-11915

SOLIDIFICATION OF MEDIUM ACTIVITY LIQUID RESIDUES WITH BITUMEN (SOLIDIFICTION PAR LE BITUME DE RESIDUS LIQUIDES DE MOYENNE ACTIVITE),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
G. Lefillatre, L. Rodi, J. Champeau, R. Hullo, and L. Pecout.
Available from NTIS, Springfield, Va., as CEA-R-4378; $5.45 per copy, $1.45 microfiche. Report CEA-R-4378, Feb. 1973. 90 p, 53 fig, 18 tab, 8 ref.

Descriptors: *Nuclear wastes, *Leaching, *Public health, *Waste treatment, Treatment facilities, Radioactive waste disposal, Feasibility studies, Asphalt, Chemical precipitation, Diatomaceous earth, Laboratory tests, Pilot plants, Radioactivity effects, Burning, Strontium radioisotopes, Methodology.
Identifiers: Cesium radioisotopes.

Several nuclear fuel reprocessing wastes including ion exchange resins and diatomaceous earth were incorporated into asphalt matrixes in pilot-plant studies. Product leachability was reduced by prior coprecipitation with barium sulfate and nickel ferro-cyanide. Asphaltization of coprecipitates from various waste types reduced leachability 10-100 fold. Further treatment of the product by direct-distillation coating with a 6-mm layer of asphalt reduced leachability from about 0.1% after 2 years of immersion in water to zero after 3 years of immersion. Products of low leachability were produced by using aniomic or non-ionic asphalt emulsions or molten asphalt, but a cationic adhesive agent was unfavorable with one waste type. Segregation of the products were studied at elevated temperature, and flammability and radiation stability were tested. (Bopp-ORNL)
W73-11922

AN INVESTIGATION OF TRITIUM DECONTAMINATION,
Florida Univ., Gainesville.
J. A. Wethington, Jr.
Available from NTIS, Springfield, Va., as ORO-4201-2; $4 in paper copy, $1.45 in microfiche. Re-

port ORO-4201-2, 1972. 28 p, 8 tab, 25 ref. AEC AT-(40-1)-4201.

Descriptors: *Tritium, *Isotope studies, *Water pollution treatment, *Catalysts, Water properties, Nuclear wastes, Feasibility studies.

Catalysts for the interchange of the tritium in HTO with methane were tested in connection with potential applications in decontamination of waste water from nuclear or thermonuclear powerplants. In the absence of a catalyst, there was no interchange at 300 C and 3000 psig. Pt on alumina was subject to poisoning, but Rh on alumina was not. Wilkinson's catalyst and certain soluble Pt compounds were considered outstanding. It appeared that certain natural rocks may have catalytic activity, but not two rock samples from the Rio Blanco test site for nuclear stimulation of gas wells. (Bopp-ORNL)
W73-11925

EFFECTS OF ARTIFICIAL AERATION ON THE CHEMISTRY AND ALGAE OF TWO MICHIGAN LAKES,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 05C.
W73-11958

POLLUTION CONTROL UNDER THE PENNSYLVANIA CLEAN STREAMS LAW,
For primary bibliographic entry see Field 06E.
W73-11976

ENVIRONMENTAL HEALTH (CONSTRUCTION SITE REGULATIONS).
For primary bibliographic entry see Field 06E.
W73-11985

UPPER TRINITY RIVER BASIN COMPREHENSIVE SEWERAGE PLAN, VOLUME III, MANAGEMENT AND FINANCE PROGRAM.
Peat, Marwick, Mitchell and Co., Dallas, Tex.

Descriptors: *Sewerage, *Management, *Financing, *Regional Development, Texas, Administration, Comprehensive planning, Manpower, Personnel, Regulation, Bond issues, Loans, Grants, Investment, Sewage districts.
Identifiers: Upper Trinity River Basin (Texas), *Dallas-Fort Worth (Texas).

A management and financial plan for a regional comprehensive sewerage plan for Upper Trinity River Basin was developed following an engineering study of the area. The engineering report found that total population in this area (the Fort Worth-Dallas, Texas area) was about 2.7 million and is estimated to increase to 7.8 million by 2020. It was reported that about 53 sewage treatment plants operate in the metropolitan Fort Worth-Dallas region. It was recommended that 6 regional plants be constructed in the metropolitan area, that 47 plants be eliminated and that additional plants be constructed outside the metropolitan region. No definite cost data were developed by the previous studies. In this study, organizational and financial arrangements from other parts of the country are examined and recommended systems for the region are described. State and federal agencies would set water treatment standards. Joint systems at the local level are recommended for the operation of the treatment plants controlled by the regional North Central Texas Council of Governments. This organization would establish policy and provide for coordination of water resource development. No new governmental agency would need to be developed. Initial cost would be about $269 million by 1975, increasing to $577 million by the year 2020. Suggested financing includes: (1) municipal revenue bonds, (2) federal grants and (3) state grants. (Poertner)
W73-12010

A WATER AND SEWER PLAN: CLARKE COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.

Northeast Georgia Area Planning and Development Commission, Athens, April 1969. 89 p, 12 fig, 8 tab.

Descriptors: *Comprehensive planning, *Water supply, *Sewerage, *Regional development, Sewers, Water supply development, Data collections, Financing, Georgia, Optimum development plans, Financial feasibility, Forecasting.
Identifiers: *Clarke County (Georgia).

A comprehensive water and sewer plan for Clarke County was developed as part of an area-wide water and sewer plan prepared for the northeast Georgia Area Planning and development Commission. The primary purpose was to develop recommendations for providing water supply and sewer systems to rural areas of the County and incorporated communities under 5,500 population. A large part of Clarke County is considered urban and has been excluded from the study. This leaves only the rural fringe and the community of Winterville, which has 500 residents. Clarke County is located in northeast Georgia, about 70 miles east of Atlanta. Rainfall averages 48 inches per year and average Fahrenheit temperatures range from 46 in December to 79.5 in July with a yearly average of 62 degrees. The total 1960 population was 45,363 and is expected to grow to about 97,000 by 1990. The City of Athens recorded a 1960 population of 31,355 and is the largest urban community. Future population increases are expected mainly in the Athens area and rural areas near Athens. The county has adequate surface water supplies in rivers, but there are no lakes in the County although a reservoir occupying from 12,500 to 25,000 acres has been proposed. Domestic water supplies are obtained from wells and the City of Athens has extended water mains along most of the major and secondary thoroughfares into most parts of the County. The City participates in the cost of installing sewage collection and treatment systems and assumes operation and maintenance of such facilities. Although the water supply system will probably be sufficient for future development, a regional sewerage system plan is recommended. (Poertner)
W73-12013

A WATER AND SEWER PLAN: BARROW COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.

Northeast Georgia Area Planning and Development Commission, Athens, June 1969. 130 p, 26 fig, 8 tab.

Descriptors: *Comprehensive planning, *Water supply, *Sewerage, *Regional development, Sewers, Water supply development, Data collections, Financing, Georgia, Optimum development plans, Financial feasibility, Forecasting.
Identifiers: *Barrow County (Georgia).

A water and sewer plan for Barrow County was prepared as part of a comprehensive water and sewer plan for the Northeast Georgia Area Planning and Development Commission. Financed by the Farmers Home Administration of the USDA, this study focused on rural areas and communities under 5,500 population. Total county population in 1966 was 15,000 and there are five communities with populations between 300 and 5,500 persons. By 1990, the population of the County is expected to increase to between 18,300 and 21,600 persons. Average rainfall is about 44 inches a year, and Fahrenheit temperatures average 44 degrees in the winter and 77 degrees in the summer. Water supplies seem adequate. The Mulberry River is the primary source of municipal water and water wells serve farms in the County. The major water system in the County is located in the City of Winder in the middle of Barrow County. This city, with a 1970 estimated population of 7,500, provides water to the next four largest communities in the County--south, west and east of Winder. Only minor expansion of water delivery service to be recommended for the larger communities and no recommendations are made for the rural areas and small communities. Only one community under 5,500 population has a municipal sewage treatment system. Providing sewerage systems by 1990 is recommended for three other communities, but no recommendations are made for smaller communities or rural areas. (Poertner)
W73-12014

INVENTORY AND ANALYSIS OF EXISTING WATER AND SEWER SYSTEMS AND LONG RANGE WATER AND SEWER PLANS, NATCHEZ, MISSISSIPPI,
Jordan, Kaiser and Sessions, Natchez, Miss.
For primary bibliographic entry see Field 06D.
W73-12015

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM. VOLUME I: GOALS, OBJECTIVES, AND STANDARDS FOR WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT,
Diversified Consultants, Inc., Jackson, Miss.
J. A. Elliot, R. L. Waters, and A. D. Desmarais.
Available from the National Technical Information Service as PB-212 429. Gulf Regional Planning Commission, Gulfport, Mississippi, 1972. 181 p, 27 fig, 15 tab.

Descriptors: *Comprehensive planning, *Sewerage, *Sewers, *Solid wastes, *Flood plains, *Urban drainage, *Water works, Mississippi, Standards, Forecasting, Management, Storm water, Data collection, Surveys.

The Gulf Regional Planning Commission's primary goal, in its Urban Systems Engineering Program, is to establish simultaneous criteria, data and evaluation of existing and future anticipated requirements for (1) water supply, (2) sanitary sewerage, (3) solid waste management, (4) storm drainage, and (5) flood plain management. The four-county region of Hancock, Harrison, Jackson, and Pearl River Counties, Mississippi, will develop both short range and long term development plans to meet the needs of the region, integrating the needs to a realistic frame for financial implementation to provide the most efficient means of system improvement, operation, maintenance and management. Regional development policies will be formulated to: (1) control urban growth, (2) prevent fragmentation and duplication of utility systems, (3) encourage economy of development, (4) prevent the overdesign, underdesign or early obsolescence of public utilities, and (5) generally protect the health, safety and welfare of area residents. Regional development of utilities on the basis on natural instead of political boundaries will be encouraged. General policy statements and discussion of goals, objectives and for each area of concern are covered. (Poertner)
W73-12016

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM. VOLUME II: AREA-WIDE WATER AND SANITARY SEWERAGE SYSTEMS,
Diversified Consultants, Inc., Jackson, Miss.
J. A. Elliot, R. L. Waters, and A. D. Desmarais.
Available from the National Technical Information Service as PB-212 430, $31.50 in paper copy, $1.45 in microfiche. Gulf Regional Planning Commission, Gulfport, Mississppi, 1972. 590 p, 101 fig, 111 tab.

Descriptors: *Comprehensive planning, *Sewerage, *Sewers, *Water works, *Data collections, Surveys, Mississippi, Water demand, Water supply, Sewage treatment, Forecasting.

Volume II of this four-volume publication presents an inventory of existing and planned waterworks and sanitary sewerage systems in a four-county (Hancock, Harrison, Jackson and Pearl River) region in Mississippi. It is part of a comprehensive study of the present and future water supply, wastewater treatment, solid waste management, storm drainage and flood plain management requirements for the Gulf Regional Planning Commission. The total planning area is about 2,600 square miles with a 1970 population of 268,000 of which 74 percent is urbanized. Total water consumption is 100 mgd. The major source of water supply is ground water. The shallow aquifers are endangered by possible sea water intrusion. Other pollution problems are present as evidenced by action taken by the United States Environmental Protection Agency in classifying some of the area's water as unsatisfactory for interstate use. Industrial complexes are large water users; two such complexes in Jackson County alone account for the consumption of 55 mgd. Water works and sewerage systems presently in use, and others that are foreseen in the area, are described. (Poertner) (See also W73-12016)
W73-12017

TREATMENT OF PHENOLIC AIRCRAFT PAINT STRIPPING WASTEWATER,
Air Force Weapons Lab., Kirtland AFB, N. Mex.
R. H. Kroop.
Available from NTIS, Springfield, Va 22151 as AD-756-925 Price $3.00 printed copy; $1.45 microfiche. Technical Report No AFWL-TR-72-181, January 1973. 98 p, 33 fig, 15 tab, 37 ref, 3 append.

Descriptors: *Waste water treatment, *Phenols, *Paints, *Activated carbon, Industrial wastes, Biochemical oxygen demand.
Identifiers: Paint stripping.

The optimum treatment process for treating large volumes of phenolic paint stripping waste water was determined. Three processes were selected and tested to determine their effectiveness for the removal of the major contaminants in the waste water. These processes were oxidation with ozone, oxidation with potassium permanganate, and adsorption with granular activated carbon. Granular activated carbon adsorption provided the best removal of the organic contaminants and was also the least expensive. Phenol concentration was reduced from 3000 mg/l to less than 2 mg/l in 60 minutes of contact time. The adsorptive capacity for phenols was 0.404 gm phenols/gm of activated carbon and for chemical oxygen demand, 1.79 gm of COD/gm of activated carbon. (Knapp-USGS)
W73-12037

STUDY - WATER AND SEWER FACILITIES - MOBILE COUNTY.
Converse (J. B.) and Co., Inc., Mobile, Ala.

Prepared for South Alabama Regional Planning Commission, June, 1969. 85 p, 13 fig, 12 tab. HUD Ala. P-32 (G).

Descriptors: *Planning, *Water supply, *Sewerage, Projections, Financing, Cooperation, Costs, Alabama.
Identifiers: Inventories, Mobile County (Alabama), Utility system expansion.

Basically a town by town study of water and sanitary sewer facilities in Mobile County, this study focuses on an inventory of existing facilities and their adequacy and on needed expansions to these systems to 1990 and their associated costs. The future expansions are based on population and land use projections of the South Alabama Regional Planning Commission. Also included in the individual studies are tables of specific proposed improvements with their priority and estimated costs and maps showing the location of the systems. The most significant section deals with the city of Mobile. Mobile and its suburbs have been proceeding separately in their expansion programs and it is recommended that there be more cooperation and less duplication of facilities in the metropolitan area. (Elfers-North Carolina)
W73-12049

POTOMAC ESTUARY WASTEWATER TREATMENT PLANTS SURVEY.
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.

1970 Data Report No 27, 1973. 8 p.

Descriptors: *Water quality, *Water analysis, *Potomac River, *Estuaries, *Chemical analysis, Sampling, Analytical techniques, Nutrients, Carbon, Sewage effluents, Pollutant identification, Water pollution sources.
Identifiers: *Potomac estuary.

In order to obtain more information regarding wastewater characteristics, a 24-hour composite effluent sample from 21 Potomac Estuary sewage treatment plants for a 4-day period, April 12-15, 1970, and a 24-hour sample for September 15, 1970, were obtained. Nutrient as well as carbon analyses were made upon delivery of samples to the Annapolis Field Office. Analytical methods and results are presented for the following parameters: total phosphorus, inorganic phosphorus, total Kjeldahl nitrogrn, nitrate + nitrite, ammonia, total organic carbon, and total carbon. (Woodard-USGS)
W73-12076

CONTINUOUS PILOT PLANT STUDY OF RECYCLING OF FILTER BACKWASH WATER,
Calspan Corp., Buffalo, N.Y. Environmental Systems Dept.
L. Wang, P. E. Pallo, B. J. Schwartz, and B. T. Kown.
Journal of the American Water Waters Association, p 355-358, May 1973. 1 fig, 7 tab, 8 ref.

Descriptors: *Waste water treatment, *Water quality control, *Filters, Coagulation, Filtration, Recycling, Water purification, Chemical precipitation, Turbidity, Sludge treatment.

This article summarizes the results of a pilot plant study on the effects of backwash-water recycling on the filter operation and the plant effluent quality. In this type of operation, the wash water is mixed with raw water near the plant intake at a uniform rate. It is then subjected to the same treatment as the raw water--prechlorination, alum coagulation followed by settling and filtration and post chlorination. Under the condition used in the pilot plant operation, the following advantages of the recycling were observed: an increase in the settling rate of the basin sludge, a decrease in filter head loss, a decrease in pollution caused by discharging filter backwash water into a stream, and recovery and reuse of filter backwash water for the water supply. The disadvantage of the system is that the quantity of alum required may have to be increased slightly. In sum, the recycling method described is feasible and promising and warrants further investigation in a real water plant. (McKnight-Florida)
W73-12192

THE TECHNOLOGY OF SOLID WASTE MANAGEMENT--IMPLICATIONS FOR STATE POLICY.
California Assembly General Research Committee, Sacramento. Assembly Science and Technology Advisory Council.

For primary bibliographic entry see Field 05G.
W73-12193

SEWER AND WATER UTILITY REPORT,
Auburn Planning Board, Maine.
R. F. Cahill.
(1973). 10 p, 4 fig.

Descriptors: *Planning, *Sewage, *Water supply, Land use, *Maine.
Identifiers: Utility extensions, Auburn (Maine), Androscoggin River.

A short planning prospectus is presented for water and sewerage system extension for a small city (approximately 25,000). Some background information on the existing systems, the recent push to clean up the Androscoggin River, and the use of Lake Auburn for water supply, and general areas for water and sewer main extensions including additions to outlying industrial areas are discussed. Water main extensions should be limited to areas that will also be served by sewers in order to prevent septic tank problems. A key feature in the expansion of the sewerage system is a new treatment plant being constructed jointly by Auburn and Lewiston, since the construction of a joint facility proved to be more economically feasible than would a separate system for each city. Proposed extension maps are included. (Elfers-North Carolina)
W73-12236

SEWERAGE SYSTEMS REPORT: SOMERSET COUNTY, N.J.
Somerset County Planning Board, N.J.

March, 1972. 71 p, 2 maps, 1 append.

Descriptors: *Sewerage, Treatment facilities, Planning, Coordination, Land use, *New Jersey.
Identifiers: *Somerset County (New Jersey), Inventories, Sewerage authorities, Middlesex County (New Jersey), Raritan River.

An inventory is presented of existing sanitary sewerage facilities in Somerset County; it covers twenty-one cities and townships within the county and three regional sewerage authorities. Each sewerage system in the county is discussed in some detail and various tables are included which cover such features as level of treatment, wastewater flow, types of wastes handled, and length of sewer lines. The county has a long history of providing sanitary sewers and using coordinated systems and planning. This is partly the case because of the great need for wastewater disposal caused by the high levels of urbanization and industrialization in parts of the county. The Somerset County Master Plan for land use calls for large areas of the county to remain in low density development and this will be closely related to the future provision and location of sanitary sewers. (Elfers-North Carolina)
W73-12237

ENVIRONMENTAL STATEMENT, RIO BLANCO GAS STIMULATION PROJECT, RIO BLANCO COUNTY, COLORADO.
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-12258

RECYCLING SLUDGE AND SEWAGE EFFLUENT BY LAND DISPOSAL.

Environmental Science and Technology, Vol 6, No 10, p 871-873, October 1972. 2 fig, 3 photo.

Descriptors: *Sewage sludge, *Sewage effluents, *Land reclamation, *Sewage disposal, Spraying, Groundwater recharge, Land management, Crop production, Sprinkler irrigation, Waste water disposal, Water reuse, Strip mines, Forests,

Farms, Grasslands, Deserts, Waste water treatment, Irrigation, Sludge, *Sludge disposal, Sanitary engineering.
Identifiers: *Land disposal.

As an alternative to other advanced waste treatment systems, land disposal of treated sewage and sludge shows a great deal of promise. Many municipal, state, and federal agencies are either experimenting with or planning projects for sewage and sludge disposal on forest, cropland, or wasteland. Land disposal is based on the living filter concept--letting nature recycle nutrients and water beneficially on land rather than detrimentally through streams and lakes. Land disposal is characterized by spray irrigation or application of sewage effluent or sludge slurry in predetermined rates and amounts. The key to maximum use of the soil filter is water management and movement. Clogging or standing water will deter the filter and cause runoff. The ability of soil to handle nitrogen is the primary limiting factor for land disposal of sludge; phosphorus is involved as a second limiting factor. Several hydrogeologic factors that must be considered when selecting sites for land disposal are discussed. (USBR)
W73-12334

5E. Ultimate Disposal of Wastes

FINAL DISPOSAL OF EFFLUENT BRINES FROM INLAND DESALTING PLANTS,
Dow Chemical Co., Freeport Tex.
J. R. Booth, Jr., B. P. Shepherd, and W. F. McIlhenny.
Available from the National Technical Information Service as PB-218 432, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water, Research and Development Progress Report No 817, May 1972. 181 p, 37 fig, 13 tab, 40 ref. 14-30-2830.

Descriptors: *Brine disposal, *Desalination, *Deep wells, *Reverse osmosis, Crystallization, Environmental effects, Effluents, *Ultimate disposal.
Identifiers: Disposal methods, Subsurface injection, Site stockpile, Typical sites, Pipeline disposal, Solar ponds.

Methods of final disposal of inland desalination plant effluent brines were investigated. Within legal, ecological and environmental constraints, and using a representative range of brackish water compositions, geographical distribution, geological formations and other such factors, a technical and economic evaluation of all practical methods of final disposal was made using a systems approach. This was illustrated by six case studies. Generalized cost ranges for the component subsystems were prepared for use in approximating systems costs and identifying the least-cost disposal method for use with other specific cases. The study showed that: (1) subsurface injection of waste brines is generally less costly than other methods of final disposal; (2) discharge of waste brines into the sea preceded by pipelining more than 70 miles is not economically sound; (3) electrodialysis is the most economical method of concentrating the effluent brine to 20 percent total dissolved solids at 4.0-MGD product water rate, while solar evaporation is the most economical at the 0.4-MGD rate and solar evaporation is the most economical method of reducing a 20 percent brine to bulk dry solids. (OSW)
W73-11749

FEEDLOT WASTE UTILIZED EFFICIENTLY BY ANIMALS.
Oklahoma State Univ., Stillwater.
For primary bibliographic entry see Field 05B.
W73-11762

SOLID WASTE MANAGEMENT FOR CATTLE FEEDLOTS,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W73-11766

THE OPCCO DRYER.
For primary bibliographic entry see Field 05D.
W73-11771

THE GREAT MANURE DILEMMA,
J. Gerstner.
The Furrow, p 1-2, September/October, 1970.

Descriptors: *Waste disposal, Waste treatment, Recycling, *Farm wastes, Livestock.

Disposing of animal wastes cheaply and without pollution is fast becoming one of agriculture's knottiest problems. United States livestock produce about two billion tons of liquid and solid wastes per year, enough to fill a square mile 10 feet high every day. Complicating the state of overproduction is the development of cheap commercial fertilizer. The large differences in livestock operations make one ultimate solution to manure handling doubtful, if not impossible. The characteristics of manure change with the type of animal, feed, and climate. The requirements for practical disposal vary with the operation's size, location, and amount of land available. Some methods being developed are: feeding processed manure to livestock, burying effluent, spreading and deodorizing it, and selling it. The animal waste problem is likely to prove less technical than economic. (Wetherill-East Central)
W73-11773

FEED RECYCLING SHOWING PROMISE.
Calf News, Vol 11, No 1, p 28-29, 52, January 1973.

Descriptors: Feed lots, *Farm wastes, *Recycling, *Feeds, Equipment, California, Feeds.

This is a progress report on the Feed Recycling Company, a company selling equipment that takes manure from feedlots and converts it into feeds. The equipment is capable of converting a ton of manure into sugars, fibers, and 400 pounds of protein. Initial cost for the unit is $180,000 and operating costs are five dollars a ton. The end product is worth thirteen cents a pound, which could mean returns up to $600,000 a year for wastes from a feedlot. Feeding tests for the feed are now being run at a California research station. (Marquard-East Central)
W73-11782

FEED 'EM TRASH, CUT POLLUTION.
For primary bibliographic entry see Field 05D.
W73-11789

SUBSURFACE INDUSTRIAL WASTE WATER INJECTION IN ILLINOIS,
Ohio River Valley Sanitation Commission, Cincinnati. Committee on Subsurface Industrial Waste Water Injection.
D. L. Warner.
Available from NTIS, Springfield, Va 22151 as PB-214 269 Price $3.00 printed copy; $1.45 microfiche. Illinois Institute for Environmental Quality Document No. 72-2, February 1972. 133p, 8 fig, 11 tab, 7 ref, 5 append.

Descriptors: *Waste disposal wells, *Injection wells, *Illinois, Regulation, Legal aspects, Underground waste disposal, Waste water disposal, Industrial wastes.

Five waste-disposal wells have been drilled in Illinois. Four of these are operating. The justification for use of industrial waste water injection is that only limited alternatives are available for certain types of waste waters. The major areas of technologic concern in evaluating the feasibility of waste water injection are the geology and subsurface hydrology of the region and the well site, and the character and volume of the waste water. All of Illinois is underlain by sedimentary rocks, and in much of the State geologic conditions are suitable for waste water injection. The absence of suitable injection horizons in northern Illinois and complex geologic conditions in southern Illinois limit the potential for waste water injection in those areas. The presence of inadequately plugged abandoned oil and gas wells restricts the use of the shallower zones within the Illinois basin. It is recommended that the roles of the various State agencies in regulation of waste water injection be well defined, and a pattern for interagency action is delineated. The Environmental Protection Agency should have the principal regulatory responsibility with the Department of Mines and Minerals, the Geological Survey, the Water Survey, and the Health Department also participating. (Knapp-USGS)
W73-11820

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM. VOLUME III: AREA-WIDE SOLID WASTE MANAGEMENT,
Diversified Consultants, Inc., Jackson, Miss.
J. A. Elliott, R. L. Waters, and A. D. Desmarais.
Available from the National Technical Information Service as PB-212 431. Gulf Regional Planning Commission, Gulfport, Mississippi, 1972. 253 p, 12 fig, 61 tab.

Descriptors: *Solid wastes, *Comprehensive planning, *Municipal wastes, Regional analysis, Forecasting, Data collections, Surveys.

Solid waste management for the Gulf Regional Planning Commission jurisdiction is reported as part of a comprehensive study of problems of waterworks, sanitary sewerage, solid waste management, storm drainage and flood plain management. Three basic areas of concern are outlined in the study. In this first section an inventory and analysis is made of existing solid waste disposal facilities, evaluated with respect to their ability to serve existing and projected needs. The second section is divided into two sub-sections; the first dealing with the regional concept of solid waste management, the second dealing with guidelines for local management of solid wastes. The third area of concern is a solid waste disposal plan which deals with forecasts of future quantities of solid waste, recommended location and size of proposed landfill areas and a recommended plan of implementation. Four goals recommended for proper handling of solid wastes are: (1) the establishment of regional authorities to handle solid waste management for a short term solution, (2) utilization of state funds to operate regional solid waste management systems for the long term solutions, (3) realignment of the economy and industry to recycle and reuse material resources, and (4) incorporation of reuse and recycling into the initial design of products. These goals should be implemented on a national level as well as on the local level. (Poertner) (See also W73-12016)
W73-12018

SURVEY OF INDUSTRIAL WASTE INJECTION WELLS: VOLUME I,
Missouri Univ., Rolla. Dept. of Geological Engineering.
D. L. Warner.
Available from NTIS, Springfield, Va. 22151 as AD-756 641, Price $9.00 printed copy; $1.45 microfiche. Final Technical Report, June 1972. 675 p. USGS 14-01-001-12280.

Descriptors: *Waste disposal wells, *Disposal, *Injection wells, Alabama, California, Colorado, Florida, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Industrial wastes.

This report consists of 246 forms describing individual wastewater injection wells that have been inventoried. A table lists the 22 states in which wells are known to exist and the number of wells inventoried. The forms are grouped by state and arranged approximately chronologically within each state. All wells that have been constructed for injection of industrial wastewaters into saline water aquifers were included. In addition to operative wells, some of the wells in the survey have never been operated; others have been operated, but are now inactive or abandoned. Oilfield brine injection wells are not included, nor are wells used exclusively for injection of sewage effluent. Volume 1 contains information for Alabama, California, Colorado, Florida, Illinois, Indiana, Iowa, Kansas, Kentucky, and Louisiana. (Knapp-USGS)
W73-12051

GEOLOGY FOR PLANNING IN ST. CLAIR COUNTY, ILLINOIS.
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 02F.
W73-12069

ENVIRONMENTAL STATEMENT, RIO BLANCO GAS STIMULATION PROJECT, RIO BLANCO COUNTY, COLORADO.
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-12258

DISPOSITION OF SPOIL ON THE DUMP SITE,
Rhode Island Univ., Kingston.
S. B. Saila, and S. D. Pratt.
In: Dredge Spoil Disposal in Rhode Island Sound, Rhode Island University Marine Technical Report No 2, Kingston, p 7-14, 1972. 18 fig.

Descriptors: *Dredging, *Desilting, *Waste disposal, *Sounds, *Bathymetry, Contours, Sediment distribution, Distributions patterns, Sediment transport, Channel improvement, Navigation, Estuaries.
Identifiers: *Rhode Island Sound, Providence River (R I), Dredging spoils.

Between December 1967 and September 1970 a total of 8.2 million cubic yards of dredge spoil from the Providence River was deposited on an offshore site in Rhode Island Sound. In October 1970 divers made direct observations of topographic features, animal life, and sediment variability in the area of active dumping in order to obtain information to properly interpret bathymetric records and grab samples from the area. Within the limits of the precision of bathymetric surveys, the volume of spoil on the disposal area was the same as that reported dumped; no large-scale loss had taken place during or after the dumping operation. The presence of a layer of incohesive silt/clay on the spoil surface during the summer indicated a nonerosive physical environment during that period. The combined effect of dumping pattern, sediment properties, and hydrographic variables has produced a low cone of spoil approximately 1 mile in diameter, indicating that the 1-square-mile assigned dumping area was of adequate size. (See also W73-09142) (Woodard-USGS)
W73-12318

SEDIMENTS OF THE DREDGING AND DISPOSAL AREAS,
Rhode Island Univ., Kingston.
S. D. Pratt.
In: Dredge Spoil Disposal in Rhode Island Sound, Rhode Island University Marine Technical Report No 2, Kingston, p 15-18, 1972. 2 fig.

Descriptors: *Dredging, *Desilting, *Waste disposal, *Sediment distribution, *Sounds, Sediment transport, Correlation analysis, Sediments, Shellfish, Channel improvement, Navigation, Estuaries.
Identifiers: *Rhode Island Sound, Providence River (R I), Dredging spoils.

Between December 1967 and September 1970 a total of 8.2 million cubic yards of dredge spoil from the Providence River was deposited on an offshore site in Rhode Island Sound. The sediments encountered in this study are described to provide a basis for distinguishing spoil materials from natural sediments, predicting the stability of the spoil under the hydrographic conditions of Rhode Island Sound, and studying animal-sediment relationships. Although much of the spoil had a smaller median-grain size and a higher percentage of organic matter than the natural sediments in the dumping area, these were not always distinguising characteristics. Poor sorting and the presence of the shells of estuarine mollusks were more reliable indicators. The presence of clay, pebbles, plant detritus, oil globules, and gray or black color also identified spoil. (See also W73-09142) (Woodard-USGS)
W73-12319

CHARACTERISTICS OF THE PHYSICAL ENVIRONMENT,
Rhode Island Univ., Kingston.
T. T. Polgar.
In: Dredge Spoil Disposal in Rhode Island Sound, Rhode Island University Marine Technical Report No 2, Kingston, p 19-26, 1972. 5 fig.

Descriptors: *Dredging, *Desilting, *Waste disposal, *Sounds, *Sediment distribution, Currents (Water), Sediment transport, Distribution patterns, Seasonal, Measurement, Current meters, Data collections, Beaches, Channel improvement, Estuaries.
Identifiers: *Rhode Island Sound, Providence River (R I), Dredging spoils.

Between December 1967 and September 1970 a total of 8.2 million cubic yards of dredge spoil from the Providence River was deposited on an offshore site in Rhode Island Sound. Examination of the current and wave regimes of the physical environment in the dump site area provides some useful conclusions regarding the disposition of dumped sediments. Currents in the dump site region are dominated by the semi-diurnal tide. Instantaneous bottom currents rarely exceed 0.3 knots, whereas the net tidal transport velocity is no greater than 0.1 knots. Currents alone are not effective in resuspending sediments. During a significant portion of the year waves in the area could develop bottom velocities sufficient for the resuspension (erosion) of unconsolidated sediments. The mode of deposition and mechanical characteristics of dredged materials apparently results in an erosion-resistant deposition. The dumped material cannot be considered unconsolidated, and theoretical predictions based on the behavior of unconsolidated sediments are not applicable. Beaches in the region will probably remain free of dredge spoil traces from the dump site. (See also W73-09142) (Woodard-USGS)
W73-12320

5F. Water Treatment and Quality Alteration

A SURVEY OF DISPERSION COEFFICIENTS FOR ESTIMATING POLLUTANT TRANSPORT,
Grumman Aerospace Corp., Bethpage, N. Y.
For primary bibliographic entry see Field 05B.
W73-11814

METHOD OF PURIFYING WATER,
Aktiebolaget Atomenergi, Stockholm (Sweden). (assignee)
S. H. Ahrland, B. G. F. Carleson, and J. S. Lindhe.
U.S. Patent No. 3,730,886, 3 p, 2 ref; Official Gazette of the United States Patent Office, Vol 910, No 1, p 290, May 1, 1973.

Descriptors: *Patents, *Water purification, *Phosphates, Zirconium, *Water treatment, Cooling water, Nuclear reactors.

The primary object is to effect a method of purifying water which can be used for water having a high temperature and which results in water having an extremely low percentage of foreign anions and cations and having a pH value near 8, preferably 6 - 8. The water is treated with zirconium phosphate and then with zirconium hydroxide which removes the phosphate ions. The hydroxide is precipitated with ammonia and the precipitated zirconium hydroxide is then treated with a water solution of ammonia. (Sinha-OEIS)
W73-11881

WATER PURIFICATION,
Texaco, Inc., New York. (assignee)
H. V. Hess, and F. E. Guptill, Jr.
U.S. Patent No 3,731,801, 4 p, 1 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 910, No 2, p 535, May 8, 1973.

Descriptors: *Patents, *Demineralization, *Water purification, *Water treatment, Brackish water, Sea water, *Desalination, Scaling, Corrosion, Minerals, Hardness (Water), *Water quality control.

Mineral constituents whose solubility varies inversely with temperature are removed. The water temperature is raised by direct contact with a preheated stream of liquid hydrocarbon oil to a temperature which is sufficient to precipitate the minerals but below the temperature at which the hot oil will extract water, and at a pressure sufficient to keep the oil and water in the liquid phase. The precipitated minerals may be mechanically separated. The oil and water phases separate in one decanter, and the minerals tend to settle as a gelatinous floc at the bottom of the decanter from which the floc may be drawn off. In a second decanter, separation of oil and water again takes place and the remaining minerals settle to the bottom. When the minerals and oil have been removed, the purified water is ready for use. (Sinha-OEIS)
W73-11896

ENVIRONMENTAL HEALTH (CONSTRUCTION SITE REGULATIONS).
For primary bibliographic entry see Field 06E.
W73-11985

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM. VOLUME I: GOALS, OBJECTIVES, AND STANDARDS FOR WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT,
Diversified Consultants, Inc., Jackson, Miss.
For primary bibliographic entry see Field 05D.
W73-12016

ENTOMOLOGICAL SPECIAL STUDY NO. 44--013-72/73, LABORATORY EVALUATION OF RESIDUES MAINTAINED IN WATER TREATED WITH POLYETHYLENE FORMULATIONS OF CHLORPYRIFOS, DECEMBER 1971-APRIL 1972,
Army Environmental Hygiene Agency, Edgewood Arsenal, Md.
M. A. Lawson.
Available from NTIS, Springfield, Va. 22151, as AD-755 517, Price $3.00 printed copy; $1.45 microfiche. Report, 1972. 10 p, 4 fig, 3 ref, 2 append.

Descriptors: *Water pollution control, *Pesticides, *Water chemistry, *Chemical reactions, Laboratory tests, Pesticide residues, Plastics, Water treatment, Entomology, Insect control.
Identifiers: *Chlorpyrifos, Chlorinated polyethylene.

Laboratory evaluations were conducted for 16 weeks to compare, under static conditions, residue levels maintained in water treated with three chlorinated polyethylene pellet formulations of chlorpyrifos (0,0-diethyl 0- (3,5,6-trichloro-2-pyridyl) phosphorothioate). All pellets were cylindrical in shape and had a specific gravity > 1.0. Each formulation was evaluated at dosages of 0.25, 0.5 ppm in one gallon glass jars containing three liters of distilled water. Treatments and controls were replicated three times. Water samples were removed from the jars weekly, partitioned with hexane, and subjected to electron capture gas chromatographic analysis to determine chlorpyrifos residues. Data were subjected to three-way analysis of variance to determine effects of formulation, dosage, week after treatment, and the interactions thereof, on residues maintained in the water. Peak residue levels occurred within seven to ten weeks after treatment for all formulations at each dosage. A gradually decreasing trend in residues began after ten weeks for all formulations. Higher dosages resulted in significantly higher residue levels during each week of the study. There were no significant differences among the three formulations in the amount of residues maintained in the water during the 16-week test. (Woodard-USGS)
W73-12042

STUDY - WATER AND SEWER FACILITIES - MOBILE COUNTY.
Converse (J. B.) and Co., Inc., Mobile, Ala.
For primary bibliographic entry see Field 05D.
W73-12049

VIRUS IN WATER: II. EVALUATION OF MEMBRANE CARTRIDGE FILTERS FOR RECOVERING LOW MULTIPLICITIES OF POLIOVIRUS FROM WATER,
Gulf Coast Water Hygiene Lab., Dauphin Island, Ala.
W. F. Hill, Jr., E. W. Akin, W. H. Benton, and T. G. Metcalf.
Appl Microbiol. Vol 23, No 5, p 880-888. 1972. Illus.
Identifiers: *Filters (Membrane cartridge), Multiplicities, *Poliovirus, Virus, *Water treatment.

The efficiency of a Millitube MF cartridge filter, a membrane filter, for recovery of poliovirus from 100-gal volumes of both fresh (tap) and estuarine water was determined. In the high multiplicity of virus input-output experiments, recovery of 97% or greater of input virus was achieved in both types of water when the final concentration of divalent cation as Mg2+ was 1200 microgram/ml and the pH was 4.5. Virus was effectively eluted from the membrane cartridge with 5 times nutrient broth in 0.05 M carbonate-bicarbonate buffer at pH 9.0. Four elutions of 250 ml each were used. In the low multiplicity of virus input-output experiments under the same cationic and pH conditions, up to 67% of the input virus was recovered when the virus was further concentrated from the eluates by the aqueous polymer 2-phase separation technique. The volume reduction was 126,000-190,000 to 1. The use of the combined techniques, i.e., membrane adsorption followed by aqueous polymer 2-phase separation, provided a highly sensitive, simple, and remarkably reliable sequential methodology for the quantitative recovery of poliovirus occurring at multiplicities as low as 1 to 2 plaque-forming units/5 gal of water.--Copyright 1972, Biological Abstracts, Inc.
W73-12187

PREVENTING FILAMENTOUS SCALE IN WELL WATER,
Sayreville Water Works, N.J.
A. Piatek.
Water and Wastes Engineering, Vol 4, No 12, p 54-55, December 1967, 9 ref.

Descriptors: *Water treatment, *Groundwater, *Iron bacteria, *Wells, *Corrosion, Phosphates.
Identifiers: Pumping efficiency, Sulfamic acid.

Growths of iron bacteria plugged an 8-in. line and well casings. A system of chemical treatment has been found effective in preventing the formation of filamentous scale and also apparently reducing the level of corrosion. The well is surged with a solution of calgon (100 lb. per 50 gal. of water); then 5 lb of HTH (calcium hypochlorite) (dissolved in 5 gal. water) is added, and surged to mix. 15 gal Anthium Dioxcide (Chlorine dioxide) is added, the total mixture is surged for 2 hrs. (15 min. on and 15 min. off), then allowed to stand overnight. The well content is pumped into the 3,000-ft. 8-in.-diameter line to the treatment plant then (after standing overnight) flushed back to waste. An inhibited sulfamic acid is introduced to the well and another backflush is performed. Treatment every two months is required to maintain pumping efficiency. (Bean-AWWARF)
W73-12188

CONTINUOUS ION EXCHANGE SOFTENING,
Permutit Co., Paramus, N.J.
G. Alexander.
Water and Wastes Engineering, Vol 6, No 1, p 28-29, January 1969. 2 fig.

Descriptors: *Water treatment, Water quality, *Water softening, Hardness (Water), *Ion exchange, *Resins.
Identifiers: *Countercurrent ion exchange.

Continuous countercurrent ion exchange for water softening is applicable to both water and waste water treatment. The equipment in the system has been developed to provide efficient and simple operation in softening municipal water supplies. The Permutit CCIX system for this application is described. During the softening cycle, the raw water flows upward and the resin moves downward in a countercurrent direction. When the water and the resin are in contact, magnesium and calcium ions are exchanged for sodium ions on the resin. Normally when the resin becomes partially exhausted it does not remove all the calcium and magnesium ions and there is a leakage of some hardness through the resin. In the continuous countercurrent system, however, the last resin to contact the water is always the most completely regenerated; therefore minimum leakage occurs. Removal of exhausted resin from the bottom of the vessel and replacement with fully regenerated resin at the top maintains this highly efficient softening cycle. (Bean-AWWARF)
W73-12189

ADSORPTION AND FILTRATION WITH GRANULAR ACTIVATED CARBON,
Calgon Corp., Pittsburgh, Pa.
D. G. Hager.
Water and Wastes Engineering, Vol 6, No 8, p 39-43, August 1969. 6 fig, 2 tab, 7 ref.

Descriptors: *Water treatment, *Activated carbon, Efficiencies, Adsorption, Filtration, Performance, Carbon filters.
Identifiers: *Carbon reactivation.

Granular activated carbon beds, coupled with periodic reactivation of the carbon, offer removal efficiency with both theoretical and practical advantages. In the treatment of water and wastes, granular carbon demonstrates utility for simultaneous adsorption, filtration, and removal of excess oxidants. The application of granular activated carbon to potable water treatment is described and performance results in municipal water installations in England, Germany and the United States are reviewed. (Bean-AWWARF)
W73-12190

CONTINUOUS PILOT PLANT STUDY OF RECYCLING OF FILTER BACKWASH WATER,
Calspan Corp., Buffalo, N.Y. Environmental Systems Dept.
For primary bibliographic entry see Field 05D.
W73-12192

SAFE DRINKING WATER.
For primary bibliographic entry see Field 05G.
W73-12205

5G. Water Quality Control

METROPOLITAN WATER INTELLIGENCE SYSTEMS - COMPLETION REPORT, PHASE II,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg, J. W. Labadie, G. L. Smith, D. W. Hill, and B. H. Bradford.
Available from the National Technical Information Service as PB-221 992, $6.00 in paper copy, $1.45 in microfiche. Water Resource Systems Program Completion Report, June 1973, 155 p, 20 fig, 61 ref, 1 append. OWRR-C-3105 (No 3685) (1). 14-31-0001-3685.

Descriptors: *Control systems, *Sewers, *Storm runoff, *Overflow, *Optimization, Water pollution control, Storage, Reservoir operation, Mathematical models, Dynamic programming, Automatic control, *Combined sewers.
Identifiers: *Mathematical programming, Optimal control theory, Control logic.

The results of Phase II of the project 'Metropolitan Water Intelligence Systems' (MWIS) are reported. The special type of MWIS considered is the fully automated control system for combined sewer systems. Technical data are presented on computer and control equipment, on the formulation, on the control strategy problem and on optimization techniques for developing control logic. The Real-Time Automation and Control System (RTACS) Model is presented as a simulation model which can be used off-line to develop control logic. The hydrologic, hydraulic and control models needed in either an RTACS or an RTACS Model are discussed. The socio-political problems associated with implementing a MWIS are related to similar problems experienced in implementing any information system or automation effort. The problems facing local decision makers who must comply with shifting standards under heavy time, technological, financial and political constraints are related to their personal objectives. Proposals are advanced for social modeling techniques which could help in MWIS implementation.
W73-11704

CONFINEMENT FEEDING - PROS, CONS, AND TIPS,
Illinois Univ., Urbana.
D. G. Jedele.
Feedlot Management, Vol 13, No 1, p 21-23, January, 1971.

Descriptors: Runoff, Water pollution, Air pollution, Performance, *Feedlots, *Farm wastes, Illinois, *Confinement pens.

Advantages and disadvantages of confinement feeding are described. Aspects the feeder should investigate before beginning construction of confinement buildings are discussed. (Fomby-East Central)

W73-11763

POLLUTION CRACKDOWN.
The Furrow, p 4. September/October, 1970.

Descriptors: *Feed lots, *Regulation, Waste disposal, Recycling, *Farm wastes, Legal aspects, Livestock.

Cattle feeder George Reynolds was one of many stockmen forced to move farther away from expanding city limits. Many, like James Sinning, have faced law suits as high as $90,000 from people who moved next door after their feedlots had been established. Some stockmen are working with authorities to prevent embarrassing or costly law suits in the future. Lawsuit tips. Locate feedlots away from neighbors and streams. Ag engineer E. H. Davis says, 'Try to make friends with your neighbor, so you understand his problems and he understands yours.' (Wetherill-East Central)
W73-11785

REGISTRATION IS REQUIRED AS GOVERNMENT MOVES TO CONTROL WATER POLLUTION FROM LARGE FEEDLOTS,
J. Richter.
Beef, p 20. July, 1971.

Descriptors: *Feed lots, *Waste disposal, Farm wastes, Legal aspects, Water pollution control.
Identifiers: *Registration.

As of July 1, 1971, feedlots with over 1,000 head must apply for permits to discharge effluents into waterways. Smaller units, those that don't discharge from a single point source, or those that are in states of tougher control do not have to register. Agencies involved are the EPA and the Army Corp of Engineers working with the Refuse Act of 1899. (Marquard-East Central)
W73-11786

ENGINEER SAYS FEEDERS CAN HANDLE MOST POLLUTION CONTROL PRACTICES.

Beef, p 15. July, 1971.

Descriptors: *Feed lots, Runoff, *Farm wastes, Water pollution control, Nebraska.

75% of feedlot pollution problems can be controlled by the individual. Small operators can receive help from the Soil Conservation Service while large operators must go to engineers to solve the other 25%. Nine suggestions are offered for control of runoff. (Marquard-East Central)
W73-11788

EROSION PREVENTION DURING HIGHWAY CONSTRUCTION BY THE USE OF SPRAYED ON CHEMICALS,
Virginia Highway Research Council, Charlottesville.
D. C. Wyant, W. C. Sherwood, and H. N. Walker.
Available from NTIS, Springfield, Va 22151 as PB-213 207, Price $3.00 printed copy, $1.45 microfiche. Report 72-R1, July 31, 1972. 37 p, 4 fig, 11 plate, 15 tab, 18 ref, append.

Descriptors: *Erosion control, *Bank protection, *Coatings, *Roadbanks, Virginia, Soil erosion, Slope protection, Coal tar coatings, Plastics.

The erosion inhibiting potential of nine commercial plastic chemicals was evaluated. All chemicals were also compared with the conventional method of straw tacked with an asphalt emulsion, and with untreated soil. In Virginia there are three principal physiographic provinces. The soils in each province are significantly different in composition and erodibility. In each area two highway slopes with a vertical height of 15 to 20 feet and a slope of approximately 2:1 were selected to be tested. The same chemicals were not the most effective in all areas. Also, no chemical performed better than the conventional method in any area. Some of the chemicals in some soils even promoted erosion. In the Ridge and Valley physiographic province, Petroset SB and Soil Gard were the most effective. For the soils in the Piedmont physiographic province, none of the chemicals performed well. In the sandy soils of the Coastal Plain physiographic province, Petroset SB and straight asphalt emulsion were very effective. Both are more expensive than, but about equal in effectiveness to, the conventional straw-asphalt method. (Knapp-USGS)
W73-11855

OIL SKIMMING APPARATUS,
C. Damberger.
U.S. Patent No 3,726,406, 4 p, 9 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 909, No 2, p 593, April 10, 1973.

Descriptors: *Patents, Skimming, Equipment, *Oil spills, *Oil pollution, *Pollution abatement, *Water quality control, *Water pollution control.
Identifiers: Oil booms, *Water pollution prevention.

The oil slick is drawn into the skimmer by a cable water fence gathered by boat equipment and drawn toward the skimmer body. The fence is made up of a series of floatable blocks that connect by pin opening and locking devices. The skimmer may be a hopper or funnel shaped body closed at its bottom end and open at its top. Hot water is directed against the underside of the oil slick to make the oil pass more readily over a float and into the skimmer body. The hot water hose is connected to a vacuum pump. The heated oily water is delivered to a separator from which the separated oil is moved to a storage tank. The apparatus may be adapted for use about an oil derrick or oil tanker to contain lost oil. (Sinha-OEIS)
W73-11873

METHOD AND APPARATUS FOR SEPARATING WATER FROM A MIXTURE OF A GRANULAR MATERIAL AND WATER,
Maschinenfabrik Buackau R. Wolf A.G., Munich (West Germany). (assignee)
K. Pause, and H. Buzga.
U.S. Patent No 3,730,343, 7 p, 4 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 910, No 1, p 161, May 1, 1973.

Descriptors: *Patents, *Water treatment, *Centrifugation, Granules, *Evaporation, Equipment, Separation techniques, *Water quality control.
Identifiers: Centrifuges.

A centrifuge is described for separating water from a mixture of granular material and water. Water not retained by the granular material is separated by flowing through a screen by the action of gravity. Within the centrifuge there are zigzag-shaped radial channels and slanted screens. Water which adheres to the granular material is evaporated by streams of air blowing into the outer end of the zigzag-shaped channel and into a discharge duct for transporting the granular material while evaporation of remaining water continues. (Sinha-OEIS)
W73-11875

SKIMMING SYSTEM,
C. H. Prewitt.
U.S. Patent No 3,730,346, 5 p, 10 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 910, No 1, p 162, May 1, 1973.

Descriptors: *Patents, *Oil pollution, *Oil spills, Skimming, *Pollution abatement, *Water pollution control, *Water quality control, Separation techniques, Equipment.
Identifiers: *Water pollution prevention.

This system consists of an oil skimming unit, which is self-propelled but tethered to the mother craft, and has flexible conduits to transfer fluid to the mother craft where it is separated. The skimmer has an elongated trough extending laterally of the path along which the unit is propelled. The trough has forward and aft horizontal edges lying in the same horizontal plane to avoid creating a bow wave condition and allow the floating fluid to be drawn into the trough across both foreward and aft edges. A submersible pump coupled to the skimming unit permits the conduct of fluid to the mother craft by positive pressure rather than suction. The output of the pump is controlled. An automatic adjustment of fluid volume prevents the unit from floating too high or sinking too low by virtue of the weight of the fluid contained in the trough supplementing the pumping rate adjustment. (Sinha-OEIS)
W73-11876

OIL CONTAINMENT BOOM,
Reynolds Submarine Services Corp., Miami, Fla. (assignee)
A. L. Markel, and J. R. R. Harter.
U. S. Patent No 3,731,491, 3 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 910, No 2, p 455, May 8, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Water pollution control, *Water quality control, Equipment, *Pollution abatement.
Identifiers: Oil containment, *Water pollution prevention.

An oil containment boom is formed into an elongated strip of corrugated metal by securing together sections of corrugated sheet metal in end-to-end fashion. The corrugations in the aluminum sheet material are oriented vertically to provide floating flexibility in both the vertical and horizontal planes. Weights may be attached to the corrugated metal strip to vary the freeboard height of the floating boom. For use in rough sea conditions, small light weight stabilizer or outrigger floats may be bolted to the boom to provide further reserve flotation and a righting moment arm to each side of the boom. The stabilizer or outrigger floats may attached at regular intervals such as 6 foot intervals. (Sinha-OEIS)
W73-11882

METHOD FOR REMOVING OIL AND DEBRIS FROM WATER,
Standard Oil Co., Chicago, Ill. (assignee)
J. F. Grutsch, and R. C. Mallatt.
U.S. Patent No 3,732,161, 2 p, 6 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 910, No 2, p 621, May 8, 1973.

Descriptors: *Patents, *Flotsam, *Oil spill, *Oil pollution, Equipment, *Filtration, *Pollution abatement, Filters, *Water quality control, *Water pollution control, Slime.
Identifiers: Polyurethane, *Water pollution prevention.

Buckets are attached to an endless chain which moves through a closed loop path. The buckets catch debris and as they rise on the loop they dump the debris or oil into a holding bin. The endless chain is made up a series of interconnected foraminous chambers holding a regenerable porous filter material such as polyurethane. Preferably the filter material will have an outer large pore section and an inner small pore section. As the chain moves the filter material absorbs surface and subsurface oil from the water passing through the filter material. The filter material is regenerated by squeezing the filter material to release the oil into a container or holding bin. (Sinha-OEIS)
W73-11886

METHOD OF REMOVING OIL SPILLS FROM WATER,
Texaco, Inc., New York. (assignee)
F. C. McCoy, H. V. Hess, and R. L. Sung.
U.S. Patent No 3,732,162, 3 p, 1 ref; Official Gazette of the United States Patent Office, Vol 910, No 2, p 622, May 8, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, Asphalt, *Coagulation, *Pollution abatement, *Water quality control, *Water pollution control.
Identifiers: Petroleum wax.

A coagulant such as asphalt having a melting point above about 250F, and mixtures of asphalt and petroleum waxes with hydrophilic anticaking agents are used to absorb oil floating on water. The coagulant may be sprayed while in the molten state onto the oil spill where it will solidify and flux with the oil. The resulting semi-solid mass which has a lesser density than water will float until removed. (Sinha-OEIS)
W73-11891

FLOATING DEBRIS RECOVERY APPARATUS,
R. R. Tipton.
U.S. Patent No 3,731,813, 4 p, 12 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 910, No 2, p 538, May 8, 1973.

Descriptors: *Patents, Flotsam, *Oil spills, *Oil pollution, Skimming, Equipment, *Pollution abatement, *Water quality control, *Water pollution control.

A marine vessel is equipped with a holding basin into which flotsam or oil is moved by a rotating skimmer with a floating wier along the edge of the basin used to separate the floating liquid debris from the surface of the water and allow it to flow into a collection tank. A conveyor is used to remove the solid debris from the holding basin. (Sinha-OEIS)
W73-11893

LIQUID FILTERING APPARATUS,
For primary bibliographic entry see Field 05D.
W73-11898

DEPARTMENT OF ENVIRONMENTAL QUALITY; EXECUTIVE COMMITTEE.
For primary bibliographic entry see Field 06E.
W73-11964

WATER RIGHT CHANGES TO IMPLEMENT WATER MANAGEMENT TECHNOLOGY,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 06E.
W73-11969

PROCEDURAL REGULATIONS OF THE NEW ALABAMA WATER IMPROVEMENT COMMISSION,
Union Bank and Trust Co., Montgomery, Ala.
For primary bibliographic entry see Field 06E.
W73-11970

KANSAS-NEBRASKA BIG BLUE RIVER COMPACT.
For primary bibliographic entry see Field 06E.
W73-11972

MARINE SANCTUARIES IN CALIFORNIA.
For primary bibliographic entry see Field 06E.
W73-11973

POLLUTION CONTROL UNDER THE PENNSYLVANIA CLEAN STREAMS LAW,
For primary bibliographic entry see Field 06E.
W73-11976

AN ACT RELATING TO IRRIGATION AND WATER CONSERVATION.
For primary bibliographic entry see Field 06E.
W73-11980

LITTLE CALUMET RIVER BASIN COMMISSION.
For primary bibliographic entry see Field 06E.
W73-11983

GREAT LAKES RIVER BASINS COMMISSION.
For primary bibliographic entry see Field 06E.
W73-11984

ENVIRONMENTAL HEALTH (CONSTRUCTION SITE REGULATIONS).
For primary bibliographic entry see Field 06E.
W73-11985

ENVIRONMENTAL MANAGEMENT.
For primary bibliographic entry see Field 06E.
W73-11986

UPPER MISSISSIPPI RIVERWAY COMPACT.
For primary bibliographic entry see Field 06E.
W73-11989

WATER QUALITY COMMISSION.
For primary bibliographic entry see Field 06E.
W73-11991

MILLDAMS AND RACES.
For primary bibliographic entry see Field 06E.
W73-11992

SOIL CONSERVATION.
For primary bibliographic entry see Field 06E.
W73-12002

WATER AND AIR POLLUTION CONTROL ACT.
For primary bibliographic entry see Field 06E.
W73-12003

THE PROBLEM OF PHOSPHORUS IN NEW YORK'S WATERS.
New York State Dept. of Environmental Conservation, Albany.

February 1973. 23 p, 28 ref.

Descriptors: *Phosphates, *Water pollution sources, *Eutrophication, *Detergents, *New York, Legislation, Water pollution, Municipal wastes, Sewage treatment, Waste water treatment, Nutrients, Nutrient removal, Reviews.

A major cause of accelerated eutrophication of lakes in New York State is the enrichment of lake water with phosphorus from detergents. Studies have shown household detergents to be the source of about half of the phosphorus content in municipal waste water discharges. Recognizing this problem, the New York State Legislature adopted laws to limit the phosphate content of household cleaning products to 8.7 percent by January 1, 1972 and to trace levels by June 1, 1973. It is also the policy of the State to reduce phosphorus in waste water discharges through the use of tertiary sewage treatment, because this will remove the phosphates contributed by detergents and other sources as well. However, implementation of tertiary treatment will take a minimum of ten years, and many lake communities do not have sewers or central treatment plants. The banning of phosphates causes problems, however. Flame-retardent fabric often loses its ability to remain fire-resistant when washed in low phosphate or no-phosphate detergent. Further research into other methods of fire proofing should eventually result in fire-treatment methods that are not adversely affected by phosphate-free detergents. Dishwasher detergents, which constitute only 3 percent of all phosphate in detergents, are presently ineffective without phosphates. Substitutes for phosphates can also be toxic to humans and need to be studied before put into wide use. Modifications may be needed in New York State law to cope with these difficulties. A survey found that 15 states and 54 cities and counties have taken legislative action to cope with detergent phosphates. (Poertner)
W73-12012

MISSOURI WATER QUALITY STANDARDS SUMMARY.
Missouri Clean Water Commission, Jefferson City.

Available from NTIS, Springfield, Va 22151 as PB-214 087, Price $3.00 printed copy; $1.45 microfiche. Environmental Protection Agency--Missouri Clean Water Commission Publication, May 1972. 39 p, 7 fig.

Descriptors: *Water quality standards, *Missouri, *Water pollution control, *Interstate rivers, *Water Quality Act, Pollution abatement, Water quality control, Regulation, Waste disposal, Industrial wastes, Municipal wastes.

In the Water Quality Act of 1965, Congress authorized the establishment of water quality standards for interstate (including coastal) waters. Water quality standards approved by both the Federal Government and the State of Missouri are presented. The standards consist of three major components: designation of the uses which interstate waters are to serve, specification of narrative and numerical criteria to protect and enhance water quality, and specification of a plan of implementation and enforcement, which includes treatment and control requirements for municipal, industrial and other wastes discharged to or affecting interstate waters. The standards are enforceable under the State water pollution control statutes and the Federal Water Pollution Control Act. (Woodard-USGS)
W73-12034

WATER SUPPLY AND SEWERAGE PLANNING IN CENTRAL MERRIMACK VALLEY REGION: PHASE ONE.
Metcalf and Eddy, Inc., Boston, Mass.

Prepared for Central Merrimack Valley Regional Planning District, September 1970. 32 p, 1 fig, 6 tab, 1 append. HUD Mass. P-67.

Descriptors: *Planning, *Water supply, *Sewerage, Pollution abatement, Massachusetts.
Identifiers: *Merrimack River Basin, Utility systems expansion, Inventories, Lawrence (Mass), Newbury (Mass), West Newbury (Mass), Newburyport (Mass), Andover (Mass), Methuen (Mass), North Andover (Mass).

This very general planning study of water supply and sewerage needs for fifteen cities and towns in the Central Merrimack Valley is oriented toward describing planning situations and strategies rather than specific projects. The three basic parts of the report are (1) a discussion of the use of the streams in the Merrimack basin for both water supply and wastewater disposal; (2) a water supply systems inventory and planning strategy; and (3) a sewerage systems inventory and planning strategy. With regard to water supply the cities tend to fall into three categories: those where the future supply is reaching a critical stage, e.g. Lawrence and Newburyport; those with adequate supplies and possible responsibilities to supply neighboring urban areas; and those that can rely on local

groundwater supplies. In relation to sewerage, four cities are planning a sub-regional treatment plant and interceptor sewer system, four others are under state orders to improve their level of wastewater treatment, and the remaining urban areas have no treatment. (Elfers-North Carolina)
W73-12043

STUDY - WATER AND SEWER FACILITIES - MOBILE COUNTY.
Converse (J. B.) and Co., Inc., Mobile, Ala.
For primary bibliographic entry see Field 05D.
W73-12049

WATER SUPPLY VOLUME OF TECHNICAL APPENDIX FOR REGIONAL UTILITIES STUDY.
Minges (James S.) and Associates, Inc., Farmington, Conn.

Prepared for Capitol Region Planning Agency, Hartford, Connecticut, 1969. 140 p, 9 fig, 6 maps, 27 ref, glossary. UPA-CONN. P-78 (G).

Descriptors: *Water supply, *Water supply development, *Water demand, *Water management (Applied), Planning, Groundwater, Surface Water Availability, Projections, Land use, Connecticut.
Identifiers: Service areas, Hartford (Connecticut), Water compensation requirements.

This appendix contains the detailed background data related to water supply and used to formulate plans and programs presented in the Regional Utilities Study. Basically a working document, it serves to illustrate the planning process involved in the formulation of the final water supply plans for the metropolitan area of Hartford, Connecticut. The data and planning information fall under several categories: (1) background data on population, land use, and planning procedures; (2) water supply inventory data such as existing sources of water, existing supply systems, and water quality analysis; (3) the future demand for water by service areas; (4) alternative water supply plan elements such as groundwater and surface water sources; and (5) program elements for implementation including staging and costs. (Elfers-North Carolina)
W73-12050

OBSERVATION ON THE SIMULATED EFFECTS OF RAIN ON LARVA OF NEODIPRION SWAINEI (HYMENOPTERA, DIPRIONIDAE),
British Columbia Univ., Vancouver. Dept. of Plant Science.
For primary bibliographic entry see Field 02I.
W73-12160

STUDIES OF THE SPRAY ZONE OF CHURCHILL FALLS, LABRADOR,
Memorial Univ. of Newfoundland, St. John's. Dept. of Biology.
For primary bibliographic entry see Field 02I.
W73-12162

ASPECTS OF THE BIOLOGY OF THE LUMBRICIDS EISENIELLA TETRAEDRA (SAVIGNY) AND DENDROBAENA RUBIDA (SAVIGNY) F. SUBRUBICUNDA (EISEN) IN A PERCOLATING FILTER,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 05C.
W73-12175

(A BILL TO BE ENTITLED: THE OIL POLLUTION COMPENSATION ACT OF 1973).
For primary bibliographic entry see Field 06E.
W73-12191

THE TECHNOLOGY OF SOLID WASTE MANAGEMENT--IMPLICATIONS FOR STATE POLICY.
California Assembly General Research Committee, Sacramento. Assembly Science and Technology Advisory Council.

Available from National Technical Information Service, U.S. Dep't. of Commerce, as PB-205 240. July 1971. 38 p, 1 fig.

Descriptors: *Solid wastes, *California, *Environmental effects, *Waste treatment, *Waste disposal, Water quality control, Disposal, Reasonable use, Governments, Comprehensive planning, Recycling, Landfills.

This panel on Solid Waste Management was charged with the task of reviewing present technological issues and with identifying constraints and opportunities for improved methods of solid waste disposal in California. The panel clarified the objectives of improved solid waste practices in California and outlined an expanded role for state government in the field of solid waste management. The major contribution is emphasis on the need for a systems approach to solid waste management and an examination of economic and social factors which are of fundamental importance in the application of improved technology. Many of the recommendations set forth general directions for state policy and action. Three major areas of concern in the management of solid waste are environmental degradation resulting from waste disposal and extraction of raw materials, accelerating costs to local government for waste handling and disposal, and resource depletion as non-renewable resources are discarded as waste and lost for future use. (Mockler-Florida)
W73-12193

REGULATION RELATING TO MONITORING AND REPORTING WASTEWATER DISCHARGES AND THEIR EFFECT UPON RECEIVING WATERS.
North Carolina Dept. of Natural and Economic Resources, Raleigh.

1973. 40 P.

Descriptors: *North Carolina, *Waste disposal, *Waste identification, *Water pollution sources, Legislation, Water pollution control, Waste treatment, Environmental sanitation, Regulation, Monitoring, Sewage effluents, Treatment facilities, Waste treatment, Sampling, Influent streams, Effluents, Permits.
Identifiers: *Administrative regulations.

This is a proposed regulation relating to monitoring and reporting of wastewater discharges and their effect upon receiving waters by the North Carolina Board of Waters and Air Resources. The regulation provides that the owner or person in charge of every water pollution control facility which receives a wastewater influent from more than one source shall report to the Department the name of every industrial establishment contributing wastes containing toxic materials. Every person subject to the regulation shall be required to maintain an approved monitoring system. In addition, biological monitoring may be required when necessary to determine whether uses of larger bodies of water are being or will be impaired by discharges sufficient in volume or character, to adversely affect the natural biota of the water involved. Penalties for violation of the regulation are provided and the regulation contains a severability clause. Charts, graphs, and applicable definitions are included. All applications for permits shall be accompanied by a proposal for a complying monitoring and reporting system. (Mockler-Florida)
W73-12194

OZARK INDUSTRIES, INC. V. STUBBS TRANSPORTS, INC. (ACTION TO RECOVER FISH-KILL DAMAGES WHEN GASOLINE FROM OVERTURNED TRUCK FOUND ITS WAY INTO SPRINGFED TROUT POOL).
For primary bibliographic entry see Field 06E.
W73-12197

REPORT ON PUBLIC HEARINGS ON THE ADOPTION OF PROPOSED REGULATIONS FOR THE PURPOSE OF IMPLEMENTING THE WATER AND AIR QUALITY REPORTING ACT OF 1971.
North Carolina Dept. of Natural and Economic Resources, Raleigh.

Board of Water and Air Resources Report, February 1, 1973. 247 p.

Descriptors: *North Carolina, *Legislation, *Monitoring, *Water quality control, *Pollutant identification, Pollution abatement, Water pollution sources, Law enforcement, Air pollution, Water pollution control, Wastes, Waste identification, Waste water (Pollution), Water conservation, Legal aspects.
Identifiers: *North Carolina Water and Air Quality Reporting Act of 1971, Administrative regulations.

The purpose of the hearing was to allow the public an opportunity to express its views on proposed regulations implementing the North Carolina Water and Air Quality Reporting Act of 1971. The Act requires first, the filing of reports with the Board of Water and Air Resources covering the discharge of wastes and air contaminants to the waters and outdoor atmosphere and second, the establishing and maintaining of approved systems for monitoring the quantity and quality of such discharges and their effects upon the air and water resources of the state. Statements were made by interested individuals, corporations, municipalities and governmental agencies. (Reed-Florida)
W73-12198

A BILL TO ASSURE THE PUBLIC IS PROVIDED WITH AN ADEQUATE QUANTITY OF SAFE DRINKING WATER.
For primary bibliographic entry see Field 06E.
W73-12199

AQUATIC PLANT CONTROL AND ERADICATION PROGRAM, STATE OF TEXAS (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 04A.
W73-12203

DISCHARGE OF UNTREATED WASTES INTO THE MISSISSIPPI RIVER.
For primary bibliographic entry see Field 06E.
W73-12204

SAFE DRINKING WATER.

Supp. Hearings--Subcomm. on Public Health and Environment--Comm. on Interstate and Foreign Commerce, U.S. House of Representatives. 92d Cong, 2d Sess, June 7, 8, 1972. 198 p, 1 chart.

Descriptors: *Legislation, *Water supply, *Public health, *Potable waters, Water sources, Environmental sanitation, Water treatment, Water purification, Domestic water, Water quality, Groundwater resources, Underground waste disposal, Governmental interrelations, Water quality standards.
Identifiers: *Congressional hearings, Administrative regulations.

H.R. 14899 would amend the Public Health Service Act and the Federal Food, Drug, and

Cosmetic Act to assure that the public is provided with safe drinking water. This legislation would provide for the establishment by the federal government of certain standards pertaining to drinking water and its sources as well as federal assistance to state agencies and other authorities for development of improved methods for the treatment and purification of water. A requirement that federal standards be developed for recreational waters was deleted from the proposal. The proposal requires development by states of programs which contain minimum requirements to control underground injection of waste which may result in the contamination of a source of drinking water. Primary responsibility for the development and operation of the program is placed on the state and only if a state fails to develop and enforce its own program will the federal government step in. Currently, few states regulate the quality of underground waters; thus, this bill would plug a potential loophole by regulating underground waste disposal. (Mockler-Florida)
W73-12205

CITIZENS FOR CLEAN AIR, INC. V. CORPS OF ENGINEERS, U.S. ARMY (PUBLIC HEARING NOT REQUIRED UNDER THE NEPA).
For primary bibliographic entry see Field 06E.
W73-12209

CIVIL LIABILITY FOR OIL POLLUTION,
A. Black.
Houston Law Review, Vol 10, No 2, p 394-425, January 1973. 201 ref.

Descriptors: *Oil pollution, *Water Quality Act, *International law, *Oceans, *Treaties, Water quality standards, Legal aspects, Liability, Water pollution sources, Oil wastes, Oil spills, Economics, United Nations, Governmental interrelations, Law of the sea, International commission.
Identifiers: Absolute liability.

Recent efforts to cope with the burgeoning contamination of the world's seas and shores from oil are examined. The historical background of international treaties relating to oil pollution is discussed. Two United Nations treaties dealing with civil liability and recovery for oil pollution damage are analyzed. The treaties are compared with related provisions of the Water Quality Improvement Act of 1970, a recent federal response to the need for environmental protection. Reconcilation of conflicting provisions of the treaties and the federal statute is recommended so that they will operate harmoniously and effectively. The United States should establish a revolving fund composed of the contributions of those who receive oil in order to meet more fairly and efficiently the need for additional compensation for oil pollution damage. It is emphasized that oil pollution of the seas represents an urgent concern of the international community. (Mockler-Florida)
W73-12213

THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972: EFFECTIVE CONTROLS AT LAST,
J. Lipman.
Brooklyn Law Review, Vol 39, No 2, p 403-425, Fall 1972. 187 ref.

Descriptors: *Rivers and Harbors Act, *Permits, *Legislation, *Water pollution control, *Federal Water Pollution Control Act, Legal aspects, Water quality standards, Waste treatment, Water pollution treatment, Water pollution sources, Governmental interrelations, State jurisdiction, Penalties (Legal), Judicial decisions.
Identifiers: *Refuse Act, *Effluent limitations, Citizen suits.

In the fall of 1972, in response to the obvious inadequacies of federal water pollution control laws, the House and the Senate each passed water pollution control bills which amended and expanded the 1899 Refuse Act and the Federal Water Pollution Control Act. The objectives of both the proposed bills and the final legislation are to restore and maintain the chemical, physical, and biological integrity of the Nations's waters. The legislation requires the application of the best practicable water pollution control technology by July 1, 1977, and the best available technology with cost considerations by 1983. This note describes the Refuse Act of 1899, the now defunct Refuse Act Permit Program and compares the 1972 Amendments to the 1899 Act. Special emphasis is placed on comparing the respective permit programs and citizen suits under the two Acts. Although the 1972 law could still be improved, it remedies most of the deficiencies of the old Federal Water Pollution Control Act and the 1899 Refuse Act. One suggested improvement would be placing strong emphasis on tax incentives for installing pollution control devices to help control pollution at the source. (Mockler-Florida)
W73-12214

WATER POLLUTION CONTROL.
For primary bibliographic entry see Field 06E.
W73-12216

LOUISIANA COASTAL COMMISSION.
For primary bibliographic entry see Field 06E.
W73-12217

SAVE OUR TEN ACRES V. KREGER (STANDARD OF JUDICIAL REVIEW OF AGENCY ACTION UNDER NEPA).
For primary bibliographic entry see Field 06E.
W73-12218

CONSCIOUSNESS OF STREAMS: THE 1971 ALABAMA WATER POLLUTION CONTROL ACT.
For primary bibliographic entry see Field 06E.
W73-12219

ENVIRONMENTAL POLICY.
For primary bibliographic entry see Field 06E.
W73-12228

POLLUTION OF WATERS OF STATE.
For primary bibliographic entry see Field 06E.
W73-12230

A PROPOSAL FOR A MODEL RIVER PROJECT CONCERNING 'RIVERFRONT BEAUTIFICATION AND UTILIZATION IN METROPOLITAN AREAS.'
Omaha-Council Bluffs Riverfront Development Committee, Nebr.
For primary bibliographic entry see Field 06B.
W73-12235

NATURAL FEATURES IN BURLINGTON COUNTY.
Burlington County Planning Board, Mount Holly, N.J.
For primary bibliographic entry see Field 06G.
W73-12241

MOSQUITOES OF ARIZONA,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 04A.
W73-12243

US-USSR EXPERTISE EXCHANGE,
For primary bibliographic entry see Field 06E.
W73-12255

ENVIRONMENTAL GUIDE FOR THE U.S. GULF COAST,
National Climatic Center, Ashville, N.C.
For primary bibliographic entry see Field 06G.
W73-12310

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

SYSTEMS ANALYSIS OF THE GREAT LAKES,
Michigan Univ., Ann Arbor. School of Public Health.
For primary bibliographic entry see Field 04A.
W73-11703

DEVELOPMENT OF A STATE WATER--PLANNING MODEL, PART IV, DATA PREPARATION,
Montana State Univ., Bozeman. Water Resources Research Center.
T. Williams, D. Boyd, and R. Brustkern.
Available from the National Technical Information Service as PB-222 011, $3.00 in paper copy, $1.45 in microfiche. Report No 34, January 1973. 192 p, 13 append. OWRR-B-029-MONT (6).

Descriptors: *Water resources planning, *Planning, *Data processing, *Model studies, *Data collections.

Development of the state water planning model has been described in earlier reports (See W71-10641, W72-10435, and W73-05578). The model is a system of mathematical expressions and equations, programmed for solution on a digital computer. To use the model, it is necessary to supply as input, data of various kinds. The earlier reports have distinguished between 'primary' and 'secondary' data. Primary parameters are those for which historical records have been kept and which are available in the literature. Typical are precipitation, reservoir storage and stream discharge. Secondary parameters are those for which no records are presently available, and for which values must be estimated or generated through the model itself. Typical secondary parameters are groundwater discharge, infiltration, and consumptive use. This report describes the data compilation procedures and explains how basin average or 'lumped' values were obtained. It also documents the data which have been stored on the bank (See also W73-11709) (Holje, Montana).
W73-11708

DEVELOPMENT OF A STATE WATER--PLANNING MODEL, PART V, DATA BANK OPERATORS MANUAL,
Montana State Univ., Bozeman. Water Resources Research Center.
D. I. Stanfield, Sr., and W. H. Moore.
Available from the National Technical Information Service as PB-222 012, $3.00 in paper copy, $1.45 in microfiche. Report No 35, Jan. 1973. 87 p, 6 append. OWRR B-029-MONT (7).

Descriptors: *Water resources planning, *Model studies, *Data collections, *Computers, Montana, Computer programs.

The water resources data-bank was developed for the Water Resources Division of the Department of Natural Resources, Helena, Montana, in cooperation with the Department of Civil Engineering, Montana State University, Bozeman. Complete details are provided of the data bank as it now exists. All pertinent information is set forth including actual data resident in the bank,

completed programming specifications for data not yet available, a complete set of all associated programs written for the system, all data formats, and a discussion of the random access feature and keying formats. Also included is a special section dedicated to those system features implemented only on the XEROX SIGMA 7 machine and not on the IBM 360/40. A detailed analysis is presented of the DATA-BANK UPDATE program from a programming point of view. This will enable system analysts to make further additions to the system without in-depth referrals to the originating source. (See also W73-11708) (Holje, Montana).
W73-11709

MANAGEMENT SCIENCE, ECONOMICS AND ENVIRONMENTAL SCIENCE,
Resources for the Future, Inc., Washington, D.C.
A. V. Kneese.
Management Science, Journal of the Institute of Management Sciences, Vol 19, No 10, p 1122-1137, June 1973. 1 fig, 18 ref.

Descriptors: *Management, *Economics, *Environment, *Political aspects, *Ecology, Atmosphere, Optimization, Mathematical models, Water resources, Regions, Simulation analysis, Governments, Constraints, Cost-benefit analysis, Pollution abatement, Linear programming.
Identifiers: *Russel-Spofford model, *Residuals management, *Microeconomics, *Environmental quality.

Microeconomics and management science are closely related in terms of the tools they employ; both treat as a central question the matter of how one optimizes for an objective, in a static or a dynamic setting, given constraints upon the resources available to achieve it. Economics differs primarily in that it studies the performance of entire economic systems and major subsystems. Management science models can be expanded to examine environmental policy and the design of institutions for environmental management. This is illustrated by a quantitative model which incorporates as submodels natural atmospheric and ecological systems and the political structure of alternative forms of representative government. This model, the Russel-Spofford regional residuals management model, utilizes linear programming; furthermore, its components include environmental models (physical, chemical, and biological) which describe the fate of various residuals after their discharge into the natural environmental systems, and a set of receptor-damage functions relating the concentration of residuals in the environment and the impact on living things to the resulting damages. Evaluation and the objective function, theory of collective choice, and politicizing the Russel-Spofford model are discussed. (Bell-Cornell)
W73-11867

IMPLICATIONS OF A SYSTEMS APPROACH TO OCEANOGRAPHY,
Washington Univ., Seattle. Dept. of Oceanography.
J. J. Walsh.
Science, Vol 176, No 4038, p 969-975, June 2, 1972. 3 fig, 1 tab, 79 ref.

Descriptors: *Oceanography, *Biomes, *Systems analysis, Computers, Model studies, Simulation analysis, Marine plants, Marine biology, Marine fish, Marine animals, Data collections.
Identifiers: *Marine ecosystems, *Marine biomes.

A detailed survey of the use of systems analysis for modeling marine ecosystems is presented. Contemporary data acquisition and computer systems on ships enable oceanographers to examine data on a large number of variables while at sea. This ability to rapidly examine the changing parameters of a marine ecosystem, through either continuous monitoring or cooperative experiments aboard ship, has led oceanographers to consider undertaking holistic studies of marine exosystems. Sufficient data on the distribution of system variables can be processed fast enough for individual oceanographers to interact at sea rather than years later, to plan group experiments while in the study area, and to begin to use simulation models as tools for the synthesis of incoming data. (Bell-Cornell)
W73-11868

POPULATION AND POLLUTION IN THE UNITED STATES,
Resources for the Future, Inc., Washington, D.C.
R. G. Ridker.
Science, Vol 176, No 4039, p 1085-1090, June 9, 1973. 3 ref.

Descriptors: *Pollution abatement, *Population, *Wastes, *Model studies, *Environment, Water quality, Economics, Technology, Institutions, Systems analysis.

Man-made pollution arises as a consequence of flows of materials such as metals, fuels, and foodstuffs through the economy. Presented is a model describing the principal links between environmental pollution on the one side and population and per capita incomes on the other. Pollution is measured in points emitted per year. The proportion of unrecyclable wastes to the level of economic activity is considered, as well as damages caused by the concentration of pollution. Three kinds of damages are: (1) harm to economically valuable goods and services, such as fish killed by DDT; (2) human mortality; and (3) a wide variety of losses resulting from physical changes in the environment. Considered next are the major factors that could cause significant changes in these parameters. Discussed are: Changes in the geographic distribution of population, in the amount and composition of consumption, and in technology and institutions. It is concluded that no single cause is sufficient to explain this country's environmental problems. A slowdown in the rate of population growth is advocated to give the American people more time, time to allow for massive changes in attitudes and behavior patterns necessary for improving the quality of the environment. (Bell-Cornell)
W73-11869

DETERMINING THE BEST SIZES OF THE OPEN CUT CANALS USED IN HYDROAMELIORATIONS,
U. Berar, V. Ionescu, and D. Somnea.
Economic Computation and Economic Cybernetics Studies and Research, No 4, p 99-106, 1972. 3 fig, 2 tab, 7 ref.

Descriptors: *Canals, *Dimensions, *Hydraulics, Optimization, Estimating, Equations, Mathematical models, Irrigation water, Excess water (Soils), Water flow, Size, Systems analysis.
Identifiers: *Open cut canals, *Hydroameliorations, Froude's number, Water depth.

The dimensioning of open cut canals used for bringing irrigation water or for evacuating excess waters in the case of draining systems is a constant consideration on the part of many researchers because of the laborious necessary computing method. Many methods (envisaging graphs, tables, slide rules, etc.,) exist for the dimensioning of these structures, but generally they are difficult to use. A mathematical model is proposed which should solve the problem of the dimensioning of the irrigation canals in a number of cases. Results are presented in the form of tables. (Bell-Cornell)
W73-11870

BENEFITED WATER DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-11988

A MASTER PLANNING METHODOLOGY FOR URBAN DRAINAGE,
Rice (Leonard) Consulting Water Engineers, Denver, Colo.
For primary bibliographic entry see Field 04A.
W73-12006

A WATER AND SEWER PLAN: CLARKE COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.
For primary bibliographic entry see Field 05D.
W73-12013

A WATER AND SEWER PLAN: BARROW COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.
For primary bibliographic entry see Field 05D.
W73-12014

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM. VOLUME I: GOALS, OBJECTIVES, AND STANDARDS FOR WATERWORKS, SANITARY SEWERAGE, SOLID WASTE MANAGEMENT, STORM DRAINAGE AND FLOOD PLAIN MANAGEMENT,
Diversified Consultants, Inc., Jackson, Miss.
For primary bibliographic entry see Field 05D.
W73-12016

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM. VOLUME III: AREA-WIDE SOLID WASTE MANAGEMENT,
Diversified Consultants, Inc., Jackson, Miss.
For primary bibliographic entry see Field 05E.
W73-12018

SUMMARY REPORT ON THE UPPER BEAR CREEK EXPERIMENTAL PROJECT.
Tennessee Valley Authority, Knoxville. Div. of Water Control Planning.
For primary bibliographic entry see Field 02A.
W73-12026

NATURAL RESOURCE INFORMATION SYSTEM, VOLUMES I AND II.
Boeing Computer Services, Inc., Seattle, Wash.

Available from NTIS, Springfield, Va 22151 Vol. I p PB-211-381 Vol II as PB-211 382 Price $3.00 printed copy each; $1.45 microfiche, each. April 28, 1972. 102 p, 20 fig, 10 tab, 10 ref. NASA Task No. 160-75-04-12-10.

Descriptors: *Land management, *Remote sensing, *Aerial photography, *Data processing, Computer programs, Systems analysis, Input-output analysis, Information retrieval, Planning, Watershed management, Satellites (Artificial).
Identifiers: *Natural resources data processing.

The Bureau of Indian Affairs (BIA) and the Bureau of Land Management (BLM) are managing approximately 20% of the United States land area, some 475 million acres. Recognizing the need for development of a computer based information system which would handle remote sensing as well as conventional mapping data, BIA and BLM contracted with Boeing Computer Services for the design and construction of a prototype natural resources information system. The primary objective was the design of a computer based system which would store, process, and display data of maximum usefulness to land management decision making. The system was to include graphic input and display, and the use of remote sensing as a data source; it was to be useful at multiple management levels. The report is presented in two volumes. Volume I summarizes program activities and provides a brief description of the Natural Resources Information System. Volume II pro-

vides computer system operating procedures and instructions. (WoodardoUSGS)
W73-12040

WATER RESOURCES DATA IN ALABAMA,
Auburn Univ., Alabama. Dept. of Civil Engineering.
C. H. Harrison.
Available from NTIS, Springfield, Va. 22151 as PB-213 850 Price $3.00 printed copy; $1.45 microfich. Contract Report for Alabama Development Office, February 1972. 88 p, 1 fig, 8 tab, 74 ref. WRP 71-1.

Descriptors: *Data collections, *Alabama, *Data processing, *Hydrologic data, Computers, Planning, Water resources development, State governments.

Needs for water resources data in Alabama are compared with available data sources. The greatest deficiency is in the area of surface water quality data. Very little of the water pollution control and management data requested by the Federal Environmental Protection Agency are available in Alabama. The principle recommendations for data management are: increased utilization of computer services now offered by the U.S. Geological Survey, collection of more streamflow and water quality data during periods of low flow, employment of three programmer-engineers to aid in water resources planning and management, and consideration of the needs of the Department of Conservation in the collection of water resources data. A central computerized water resources data bank for Alabama is not recommended. (Knapp-USGS)
W73-12074

INTERNATIONAL SYMPOSIUM ON UNCERTAINTIES IN HYDROLOGIC AND WATER RESOURCE SYSTEMS, VOL. I.
For primary bibliographic entry see Field 04A.
W73-12269

ENVIRONMENTAL CONTROL SYSTEMS: TREATMENT OF UNCERTAINTY IN MODELS AND DATA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
S. F. Moore, and J. W. Brewer.
In: Proceedings (Vol I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 16-30, (1972) 3 fig, 4 tab, 21 ref.

Descriptors: *Environmental control, *Methodology, *Mathematical models, Water resources, Decision making, Monitoring, Design, Probability, Distribution, Filters, Volcanoes, Systems analysis, *Risks.
Identifiers: *Environmental systems, *Bayesian design methods, Kalman-Bucy filtering techniques, Rare occurrences theory.

In order to achieve effective environmental control, it is necessary to develop methodologies for dealing with uncertainty. A rational design method allows engineers to find the best solution, given all the available (but uncertain) information. A mathematical model is interpreted as a formalism for expressing uncertainty and implementing Bayesian design methods. The nature of uncertainty in models and data of environmental systems is examined, and a framework for dealing with uncertainty in environmental systems is established; in particular, concepts of Bayesian design and estimation theory are reviewed and redefined relative to environmental systems. The general theory is translated into a useful tool for coping with uncertainty in environmental systems using Kalman-Bucy type filtering techniques. Applications and examples include design of monitoring systems, adaptive decision making for control model identification and parameter estimations. The theory of rare occurrences is applied to volcanic eruptions to illustrate the importance of rare occurrence distributions in environmental systems. Conclusions include: 1) Uncertainty in environmental systems can be treated quantitatively and effectively; 2) Bayesian design is a rational approach, providing the necessary theoretical framework; and 3) the general theory can be translated into effective problem solving tools having application in design and management. (See also W73-12269) (Bell-Cornell)
W73-12271

EVALUATION OF SEASONAL TIME-SERIES MODELS: APPLICATIONS TO MID-WEST RIVER FLOW DATA,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 07C.
W73-12272

TECHNOLOGICAL UNCERTAINTY IN THE ECONOMIC EVALUATION OF NEW WATER RESOURCES,
Hawaii Univ., Honolulu. Coll. of Business Administration.
N. A. El-Ramly.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resources Systems, University of Arizona, Tucson, December 11-14, 1972. p 48-63, (1972). 1 fig, 6 ref.

Descriptors: Technology, *Water resources, *Economics, *Evaluation, Performance, Costs, *Decision making, Analytical techniques, Alternative planning, Mathemtaical models, Systems analysis, *Risks.
Identifiers: New systems, Confidence levels, Subjectivity (Judgment).

Presently, the accumulated operational data about new water resources (i.e., water reuse, desalting, cloud seeding) are inadequate for objective estimation of the probability distributions of their performance characteristics. Presented is a conceptual framework for taking into account, in economic evaluations, the varying degrees of confidence professed in prospective technological possibilities. To show how technological uncertainties may be evaluated, an investment concept--uncertainty cost of new systems--is introduced and analyzed. The subjectivity of uncertainty is discussed, and a conceptual representation of the effect of information upon confidence level is developed. A simple analytical model describing the decision problem of choice between two alternatives with different levels of confidence in achieving anticipated performances is suggested. This model can be used to arrive at decisions in specific cases provided that the uncertainty cost can be estimated. Finally, the conceptual framework is applied to interpret some general trends, and to provide objective explanations for decisions in specific cases. Although attention is focused on explaining the manner in which the proposed methods of analysis can be used in the economic evaluation of new water resources, nevertheless the conceptual framework is equally valid to any situation where competing systems with different degrees of uncertainty are involved. (See also W73-12269) (Bell-Cornell)
W73-12273

ANALYSIS OF STREAMFLOW FORECASTING UNCERTAINTY,
California State Univ., Sacramento.
For primary bibliographic entry see Field 04A.
W73-12277

RELIABILITY AND UNCERTAINTY IN PREDICTING TRANSPORT PROCESSES IN NATURAL STREAMS AND RIVERS,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W73-12279

HYDROLOGIC FORECASTING WITH SEQUENTIAL DETERMINISTIC AND STOCHASTIC STAGES,
Water Resources Board, Reading (England).
For primary bibliographic entry see Field 04A.
W73-12280

A PLAN FOR THE CONSTRUCTION AND TESTING OF WATER POLLUTION FORECASTING MODELS,
Missouri Univ., Columbia. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 05B.
W73-12281

UNCERTAINTIES IN ESTIMATING RUNOFF--PRODUCING RAINFALL FOR THUNDERSTORM RAINFALL-RUNOFF MODELS,
Agricultural Research Service, Tucson, Arizona. Southwest Watershed Research Center.
For primary bibliographic entry see Field 02A.
W73-12282

REDUCTION OF UNCERTAINTIES IN AUTOCORRELATION BY THE USE OF PHYSICAL MODELS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02A.
W73-12283

STREAMFLOW FREQUENCY USING STOCHASTICALLY GENERATED HOURLY RAINFALL,
CH2M/Hill, Bellveue, Wash.
For primary bibliographic entry see Field 02E.
W73-12284

TESTS OF STATIONARITY OF HYDROLOGIC TIME SERIES,
Illinois Univ., Urbana. Dept. of Hydraulic Engineering.
For primary bibliographic entry see Field 02A.
W73-12286

STOCHASTIC MODELS FOR PRECIPITATION,
Metropolitan State Coll., Denver, Colo. Dept. of Mathematics.
For primary bibliographic entry see Field 02B.
W73-12287

INFORMATION TRANSFER VIA REGRESSION IN MARKOVIAN WORLDS,
IBM Watson Research Center, Yorktown Heights, N.Y.
J. R. Wallis, and N. C. Matalas.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 410-447, (1972). 2 fig, 18 tab, 11 ref.

Descriptors: Hydrology, *Monte Carlo methods, *Stochastic processes, Water demand, Hydrologic data, Networks, Analytical techniques, Probability, Decision making, *Risks.
Identifiers: *Information transfer, *Data programs.

The uncertainity in the transferrability of information via regression is examined. Monte Carlo experiments used to assess the risks inherent in deciding whether or not estimates of correlation

coefficients exceed critical values for information transfer are discussed. By Monte Carlo technique, it is found that the information content of the mean is rather insensitive to values of the serial correlation coefficient experienced in hydrology. Similarly with respect to the variance, the information content is more sensitive to serial correlation, particularly for positive values. The use of sample estimates of serial and cross correlation introduces uncertainity as to whether or not information is transferrable between sites. In terms of the prior distribution for the population values of serial and cross correlation, the probability of making the correct decision regarding the transfer of information on the bases of the sample estimates of serial and cross correlation has been defined over the complete sample space. This probability apparently is not extremely sensitive to the assumed prior distributions nor to the length of sequence. Sensitivity increases as the values on which the priors are concentrated approach the decision for the transfer of information as defined by the population serial and cross correlations. (See also W73-12269) (Bell-Cornell)
W73-12294

6B. Evaluation Process

A CASE STUDY IN INTERSTATE RESOURCE MANAGEMENT: THE CALIFORNIA-NEVADA WATER CONTROVERSY, 1865-1955,
California Univ., Davis. Dept. of History.
W. T. Jackson, and D. J. Pisani.
Available from the National Technical Information Service as PB-222 028, $4.50 in paper copy, $1.45 in microfiche. Water Resources Center, University of California Davis, Contribution No 142, May 1973. 51 p. OWRR A-046-CAL (1). UCAL-WRC-W-380.

Descriptors: *Interstate, *Water allocation (Policy), *Lake Tahoe, *History, California, Nevada, Competing uses.
Identifiers: California-Nevada Interstate Water Conference.

A historical summary and evaluation are presented of the controversy between Northern California and Nevada over capture, storage, and distribution of the water supply originating in the Sierra Nevada mountains between the two states. The water controversy is described from the perspective of formal interstate efforts to satisfy those interests and find an equitable way of dividing 'surplus' water between the two states. The majority of the report is concerned with interstate efforts to resolve differences over water allocation, uses, and management from 1931 to 1955. Although significant, the California-Nevada Interstate Water Conference played a relatively ineffective role during this period.
W73-11705

AN INTERACTIVE ANALYSIS OF NATURAL RESOURCE ALLOCATION IN A CONTEMPORARY ESTUARINE ECOSYSTEM,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
A. L. Sullivan.
Available from the National Technical Information Service as PB-222 003, $3.00 in paper copy, $1.45 in microfiche. Technical Report 66, May 1973. 18 p, 1 fig, 6 ref. OWRR-A-023-NY (1). 14-01-0001-1852 and 3032.

Descriptors: *Ecosystems, *Estuarine environment, *Long term planning, *Planning, *Resource allocation, *Water values, Beaches, Boating, Coastal marshes, Dredging, Estuarine fisheries, Fishing, Land development, Landfills, Marine fisheries, Model studies, Resource mix, Shellfish, Water pollution effects, Water resources.
Identifiers: Long Island (New York).

Using the bicounty Nassau-Suffolk region of Long Island as a case study, it was found that the natural resources and resource-use processes of the estuarine zone could be conceptually related in a 'system'. This ecosystem and its interrelationships were specifically displayed in a matrix form so that planning analysis for management decisions could be accomplished. Visually, the twenty-one important processes occurring in the physical, biological, resource-use (market) and socio-economic sectors of the system have been related. The effect of an increase in any one process on all of the others has been indicated in a directional sense as causing an increase, decrease, no effect or countervailing effect. The implication of these effects for planning future activities has been discussed. Emphasized in this study are: fish and shellfish, sand and gravel, waterfront land for housing and commercial development, dredging, erosion, recreational activities including boating, fishing, and swimming, park development, pesticide application and waste discharge. In addition to indicating the probable consequences on all other processes of planning decisions to increase a certain activity, the matrix also provides information about causes. If a result (e.g., loss of aesthetic quality in the estuarine zone) is deemed undesirable, citizen decision makers can be shown graphically those activities or processes causing the undesirable situation.
W73-11710

A PRECIPITATION-BASED FORECAST OF GREAT STORM FLOODS ON MOUNTAIN TRIBUTARIES OF THE DNIESTER (PROGNOZ VYSOKIKH DOZHDEVYKH PAVODKOV GORNYKH PRITOKOV DNESTRA PO OSADKAM),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
I. G. Rubtsov.
In: Formirovaniye i raschety elementov rezhima rek; Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 119, p 40-63, Moscow, 1972. 6 fig, 24 ref.

Descriptors: *Flood forecasting, *Precipitation (Atmospheric), *Storms, *Storm runoff, *Rainfall-runoff relationships, Surface runoff, Overland flow, Discharge (Water), Peak discharge, Water yield, Water loss, Water levels, Subsurface flow, Antecedent moisture content, Moisture availability, Small watersheds, Tributaries, Mountains, Equations.
Identifiers: *Ukraine, *Dniester River, Travel time, Nomograms.

Conditions of formation of outstanding storm floods are analyzed for 4 right-bank tributaries of the Dniester River (Bystritsa, Lomnitsa, Svicha, and Stryy), and a method is proposed for calculating channel inflow from storms and for forecasting maximum flood levels. The depth of storm floods is determined mainly by antecedent moisture conditions of the basin and by amount and intensity of precipitation. Catastrophic storm floods result whenever sufficiently intense rains (10 or 20 mm/hr or greater) occur on a water-saturated ground surface for a 4-6 hr period or more. Moisture conditions of a basin are considered to be critical whenever the basin moisture index is 200 mm or more or the coefficient of relative moisture availability is not less than one. Peak flow on mountain streams of the Dniester basin is derived mainly from high rates of surface runoff. Average values of surface and subsurface flow are 67 mm and 57 mm, respectively, which are 54% and 46% of the entire flood volume. The maximum daily subsurface flow is about 40 mm. An average of about 30% of the total volume of subsurface flow reaches the channel during the first days of the storm period. (See also W73-11825) (Josefson-USGS)
W73-11829

REPORT OF HYDROELECTRIC SUBPROJECT,
Idaho Univ., Moscow. Dept. of Electrical Engineering.
P. Mann.
Available from the National Technical Information Service as PB-222 059, $3.00 in paper copy, $1.45 in microfiche. University of Idaho, Moscow, Water Resources Research Institute, Scenic Rivers Study, Report No 6, 1973, 60 p, 2 fig, 23 tab. OWRR B-014-IDA (15). 14-31-001-3074.

Descriptors: *Hydroelectric power, *Benefits, Idaho, *Water resources development, Alternative water use, Pacific Northwest U.S.
Identifiers: Salmon River (Idaho).

The Salmon River is considered as a single-purpose hydroelectric energy resource from its mouth to North Fork, Idaho, (the 'Study River' portion of the river). This stretch is supported by one storage project on the upper river to represent upriver development in general. Total obtainable storage from the 7 project complex is more than adequate to regulate an average year flow to a winter power peaking pattern judged to be compatible with a mature Pacific Northwest hydrothermal system. The peaking capacity of the ultimate system approaches 8,000,000 kilowatts and average power output is 1,552,000 kw. The system is considered to be developed in three stages over a 30 year time span. Net cumulative benefits over the first 50 years of operation total 3.7 to 5 billion dollars. Annual benefits exceed $100,000,000 per year from the completed system and are expected to continue for the second 50 years of the project life. Net equivalent fossil fuel resource saving over the first 50 year term exceeds 300,000,000 tons of coal and over the 100 year term would constitute 1/2500 of the total estimated mineable U.S. coal reserves.
W73-11888

SURVEYS REQUIRED TO DESIGN NON-STRUCTURAL MEASURES,
Georgia Inst. of Tech., Atlanta.
For primary bibliographic entry see Field 06F.
W73-12005

BALANCING ENVIRONMENTAL AND DEVELOPMENTAL VALUES,
National Water Commission, Arlington, Va.
For primary bibliographic entry see Field 06F.
W73-12008

WATER AND SEWER FACILITY PLAN FOR ADAMS COUNTY, COLORADO.
Oblinger-Smith Corp., Denver, Colo.

Prepared for the Colorado Division of Planning, 1972. 51 p, 14 tab, 11 maps.

Descriptors: *Planning, *Water supply, *Sewerage, Natural resources, Projections, Rural areas, Colorado.
Identifiers: *Adams County (Colorado), Small utility systems.

This general planning study is intended as a comprehensive plan for development of municipal or public water and sewer systems to satisfy both present and future needs. Urban areas of the County near Denver are not included. The study focuses on the small towns of Bennett and Strasburg and recommends the development of additional wells, the extension of the water distribution systems, improved water and wastewater treatment, and the extension of sewer mains. Background information is presented on the county as a whole. This includes natural resources, especially soils, economic and population analyses, land use projections, community facility inventories, and several maps of the county. (Elfers-North Carolina)
W73-12044

NATIONAL LAND USE POLICY: OBJECTIVES, COMPONENTS, IMPLEMENTATION.
For primary bibliographic entry see Field 06E.
W73-12048

WATER POLICIES FOR THE FUTURE.
National Water Commission, Arlington, Va.

Available from GPO, Washington, DC 20402, Price $9.30. Final Report to the President and to the Congress of the United States, Washington, DC, June 1973. 579 p, 8 fig, 51 tab, 4 append.

Descriptors: *Planning, *Water resources development, *Water policy, *National Water Commission, Federal government, Legislation, Social aspects, Water management (Applied).

The National Water Commission's conclusions and recommendations are presented on the policies which it believes the Nation should adopt. The adequacy of basic data to support evaluation, planning, and decisionmaking in water resources varies considerably. It is strongest with respect to the quantitative aspects. The areas of greatest need are in the water quality, environmental, socioeconomic, and water-use aspects, including improvement in the program of reporting flood damages. The presently diversified water resource research effort (i.e., mission agency research and grant agency research) has generally served the Nation well. To assure continued success, steps should be taken to develop a closer tie between planning and research in order to reinforce the value and relevance of each. If the Nation is to aggressively explore the research and development of new technologies in water resources and related fields, it is important that an agency or office charged with this mission be established. (Knapp-USGS)
W73-12052

WATER PUBLICATIONS OF STATE AGENCIES. A BIBLIOGRAPHY OF PUBLICATION ON WATER RESOURCES AND THEIR MANAGEMENT PUBLISHED BY THE STATES OF THE USA.
For primary bibliographic entry see Field 10C.
W73-12161

A PROPOSAL FOR A MODEL RIVER PROJECT CONCERNING 'RIVERFRONT BEAUTIFICATION AND UTILIZATION IN METROPOLITAN AREAS.'
Omaha-Council Bluffs Riverfront Development Committee, Nebr.

May 20, 1971. 16 p, 14 fig, 3 append.

Descriptors: *Planning, *Recreation, Scenic highways, *Parks, Environmental effects, *Nebraska, *Missouri River.
Identifiers: *Riverfront beautification, Omaha (Neb), Council Bluffs (Neb).

American cities have generally neglected the potential beauty of their rivers. A four point program is presented to beautify and redevelop the riverfront area along the Missouri River in Omaha and Council Bluffs. The program calls for two 54 mile scenic, riverside parkways one one each side of the river; the development of a linear park encompassing the parkways and including water-oriented facilities and trails; the careful planning of future development near the river area such as new towns, office parks, and entertainment facilities; and a comprehensive effort to control pollution, conserve wildlife habitat, and generally improve the natural environment. Implementation of the program is envisioned via a pilot project or 'model river' approach. Federal, state, and local agencies are expected to be involved with the Corps of Engineers being the main coordinating agency. (Elfers-North Carolina)
W73-12235

SEWER AND WATER UTILITY REPORT,
Auburn Planning Board, Maine.
For primary bibliographic entry see Field 05D.
W73-12236

INTERNATIONAL SYMPOSIUM ON UNCERTAINTIES IN HYDROLOGIC AND WATER RESOURCE SYSTEMS, VOL. I.
For primary bibliographic entry see Field 04A.
W73-12269

WATER FOR ALABAMA--IDENTIFICATION OF OBJECTIVES,
Geological Survey of Alabama, University.
H. C. Barksdale.
Available from NTIS, Springfield, Va 22151 as PB-213 715 Price $3.00 printed copy; $1.45 microfiche. Administrative report, December 1969 (revised May 1970). 57 p.

Descriptors: *Water resources development, *Alabama, *Groundwater, *Surface waters, Management, Watershed management, Data collections, Hydrologic data, Project planning, Economics, Water supply, Water demand, Water quality control, Sediment control, Flood control, Urban hydrology, Hydrogeology, Streamflow.

The fundamental and the major subsidiary objectives of the current water-resources planning activity in Alabama are presented. The fundamental objective--to assure the development of the water resources of the state in the interest of all its people--is obvious and requires little elaboration. The subsidiary objectives are necessary steps toward the achievement of the fundamental objective. Each of them is discussed at some length to clearly present its scope and intent. The most pressing need for water-resources knowledge is for data on water use. Other additional knowledge needed is largely in the form of pointed additions to the existing backlog of hydrologic and economic data. The more important of these are: quantitative knowledge of the interrelations between groundwater and surface water in areas where problems may be developing as in the Huntsville and Mobile areas; quantitative knowledge of the potential yield of groundwater sources; and an expansion and intensification of the systems for collecting the time-resource data needed for management decisions. (Woodard-USGS)
W73-12315

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

AN APPROACH TO UNDERGROUND CONSTRUCTION,
D'Appolonia (E.) Consulting Engineers, Inc., Pittsburgh, Pa.
For primary bibliographic entry see Field 08A.
W73-11744

REPORT OF HYDROELECTRIC SUBPROJECT,
Idaho Univ., Moscow. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 06B.
W73-11888

BENEFITED WATER DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-11988

WATER SUPPLY VOLUME OF TECHNICAL APPENDIX FOR REGIONAL UTILITIES STUDY.
Minges (James S.) and Associates, Inc., Farmington, Conn.
For primary bibliographic entry see Field 05G.
W73-12050

6D. Water Demand

WITHDRAWAL OF WATER BY INDUSTRY IN ILLINOIS, 1970-1971,
Illinois State Water Survey, Urbana.
D. H. Schnepper, J. C. Neill, and R. L. Evans.
Circular 115, 1973. 17 p, 5 fig, 7 tab, 6 ref.

Descriptors: *Withdrawal, *Illinois, *Industrial water, Water utilization, Water reuse, Reclaimed water, Cooling water, Industrial plants.

During 1970-71 in Illinois, 11,020 million gallons per day of water was withdrawn by industry. Surface waters supplied 10,709 mgd; groundwater sources provided 311 mgd. The largest withdrawal, 80% of the total, was by steam electric powerplants and the second largest withdrawal was by the primary metals industry. As the result of reuse and conservation, water withdrawal by industry in Illinois has remained fairly stable during the past decade, despite increases in productivity. (Knapp-USGS)
W73-11813

CRAYFISH FARMING IN THE UNITED STATES,
Louisiana State Univ., Baton Rouge. Fisheries Div.
J. W. Avault, Jr.
Available from NTIS, Springfield, Va 22151 as COM-73 10278, Price $3.00 printed copy; $1.45 microfiche. Louisiana State University Center for Wetland Resources Publication, 1972. 22 p, 11 ref. (Paper presented at the 1st International Symposium on Freshwater Crayfish, September 12-15, 1972,Austria). NOAA-2-35231.

Descriptors: *Crayfish, *Rice, *Louisiana, *Fish farming, Farm ponds, Fish harvest, Rotations, Productivity.
Identifiers: *Crayfish farming.

Most of the U.S. crayfish industry is limited to Louisiana, and until a few years ago, was found almost exclusively in south Louisiana. Even with this limitation well over 10 million pounds, valued at some $5 million, is harvested annually, and close to 35 crayfish processing plants have been licensed by the Louisiana Board of Health. Crayfish farming began over 25 years ago. Crayfish are currently being farmed in three types of ponds: rice-field ponds, wooded ponds, and open ponds. In rice-field ponds crayfish are rotated with the rice. The general procedure followed by the rice farmers is to remove water from the rice field about two weeks before harvesting. This permits drying of the field to facilitate harvest. When drying begins, crayfish burrow. The second growth of rice and grasses, along with rice straw, provides food for the crayfish. Open ponds are often constructed solely for crayfish farming. In July the ponds are drained, mainly as a means of predator control since racoons and wading birds may make serious inroads on the crayfish. In September or October, the ponds are flooded to release them. Crayfish cultured in ponds are harvested in the same manner as in the wild. Both lift nets and funnel traps of chickenwire are used. Ponds with good production yield from 200 pounds to as high as 800 pounds of crayfish per acre. The price generally averages 25 cents a pound. The future of the crayfish industry looks promising and ponds devoted to crayfish farming are increasing. (Knapp-USGS)
W73-11848

INVENTORY AND ANALYSIS OF EXISTING WATER AND SEWER SYSTEMS AND LONG RANGE WATER AND SEWER PLANS, NATCHEZ, MISSISSIPPI,
Jordan, Kaiser and Sessions, Natchez, Miss.
A. R. Winter.
Available from the National Technical Information Service as PB-212 390, $4.25 paper copy, $0.95 in microfiche. Jordan, Kaiser and Sessions,

Consulting Civil Engineers, Natchez, Mississippi, May 1972. 25 p, 13 fig.

Descriptors: *Data collections, *Water works, *Water supply development, *Sewers, Sewerage, Urban drainage, Planning, Water supply, Sewage treatment, Sewage disposal, Mississippi, Water resources, Water distribution (Applied), Water demand, Water pollution, Water pollution control.
Identifiers: *Natchez (Miss).

An inventory and analysis of present water and sewerage systems was made for the Natchez, Mississippi Metropolitan Area and, based on this information, improvements are suggested. Although the Natchez area has an abundant quantity of water in surface and underground sources, shallow underground sources are contaminated by a high iron content and salt discharges from oil wells. The water is very hard, chemically. The City of Natchez is served by 9 water wells varying in depth from about 400 to 600 feet with a total rated capacity of 4.6 mgd. Smaller utilities serve outlying portions of the metropolitan area. Improvements are financially feasible only for the City Water Works and one of the private utilities. Planned improvements consist primarily of extending water service in the area and increasing supply capacity. Sewerage facilities within Natchez are provided by the City Water Works and, with only a few exceptions, the City is adequately sewered. Several subdivisions located outside the city limits are also connected to this system, while the rest of the area has no sewer system. No sewage treatment is provided for any of the areas. Improvements to the sewage collection and treatment system will consist of construction of a treatment plant to replace the outfall to the Mississippi River, as well as extension of sewers in all parts of the city. Storm drainage problems relate primarily to erosion of a 140 foot bluff along the Mississippi River, and other erosion problems. Extensive financial assistance will be needed for improvement of storm drainage. (Poertner)
W73-12015

URBAN SYSTEMS ENGINEERING DEMONSTRATION PROGRAM. VOLUME II: AREA-WIDE WATER AND SANITARY SEWERAGE SYSTEMS,
Diversified Consultants, Inc., Jackson, Miss.
For primary bibliographic entry see Field 05D.
W73-12017

WATER SUPPLY AND SEWERAGE PLANNING IN CENTRAL MERRIMACK VALLEY REGION: PHASE ONE.
Metcalf and Eddy, Inc., Boston, Mass.
For primary bibliographic entry see Field 05G.
W73-12043

WATER SUPPLY VOLUME OF TECHNICAL APPENDIX FOR REGIONAL UTILITIES STUDY.
Minges (James S.) and Associates, Inc., Farmington, Conn.
For primary bibliographic entry see Field 05G.
W73-12050

IMPACT OF NATURAL FACTORS ON WATER USE (VLIYANIYE PRIRODNYKH FAKTOROV NA VODOPOTREBLENIYE),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 06G.
W73-12062

CURRENT WATER USE REQUIREMENTS IN THE QU'APPELLE RIVER BASIN,
Saskatchewan Water Resources Commission, Regina. Investigation and Planning Branch.
R. L. Kellow.

Qu'Appelle Valley Project, Item 210, July, 1970. 74 p, 1 fig, 20 tab, 2 append.

Descriptors: *Water users, *Water demand, Industrial water, Municipal water, Water rights, Irrigation, *Canada.
Identifiers: Inventories, *Qu'Appelle River Basin, Saskatchewan, Regina, Moose Jaw, Melville.

The Qu'Appelle River basin has current water requirements of more than an estimated 167,000 acre-feet per year. The largest water use class is the industrial sector, especially electric power, petroleum and mining industries, and accounts for 77% of the total use. Current water requirements were determined for industries supplied by municipal water systems and by those such as electric companies, who provide their own water supplies. The second largest sector of water use was municipal. The cities of Regina, Moose Jaw and Melville accounted for 87% of this use. This sector was also subdivided into industrial, commercial, residential, and public uses. Two other sectors which had relatively small use requirements but which also could not depend on large supplies of water were rural households and communities without water systems, and stockwatering where the net consumption in 1966 in the basin is estimated to have been 1,000 acre-feet. Losses due to evaporation and losses in transmission may be substantial. Present gross requirements for stockwatering are thought to be considerably higher than the 1966 estimate. A section deals with water rights projects, e.g. irrigation projects where data on authorized irrigation projects with annual allocations greater than 9 acre-feet is used to make preliminary estimates of current irrigation water requirements. (Elfers-North Carolina)
W73-12232

REPORT ON WATER SUPPLY STUDY OF CERTAIN URBAN COMMUNITIES IN THE QU'APPELLE RIVER BASIN.
Saskatchewan Water Resources Commission, Regina. Water Rights Branch.

Prepared for the Qu'Appelle Basin Study Board, February, 1972. 43 p, 8 tab.

Descriptors: *Water supply, *Water demand, *Water requirements, Water sources, Water resources development, Projections, *Canada.
Identifiers: *Qu'Appelle River Basin, Saskatchewan, Manitoba.

This study assesses the water supplies of twenty-three communities in relation to water demands to 1985 and 2000. Water supplies were divided into three classifications: (1) supplies and systems currently being used; (2) supplies and systems that already exist but are not presently being used by the community in question; and (3) supplies that could be developed from presently undeveloped sources. These sources or supplies were also evaluated in terms of reliability, both hydrologically and potential for implementation. Some of the communities will be unable to meet future water demands under the first two classes of water supplies and thus must begin to investigate potential undeveloped sources of water. Community-by-community analysis of the three classes of water supplies relevant to each community and various conclusions in relation to future supplies plus tables of data, particularly on water demands or requirements are provided. (Elfers-North Carolina)
W73-12233

6E. Water Law and Institutions

POLLUTION CRACKDOWN.
For primary bibliographic entry see Field 05G.
W73-11785

REGISTRATION IS REQUIRED AS GOVERNMENT MOVES TO CONTROL WATER POLLUTION FROM LARGE FEEDLOTS,
For primary bibliographic entry see Field 05G.
W73-11786

SUBSURFACE INDUSTRIAL WASTE WATER INJECTION IN ILLINOIS,
Ohio River Valley Sanitation Commission, Cincinnati. Committee on Subsurface Industrial Waste Water Injection.
For primary bibliographic entry see Field 05E.
W73-11820

PRESERVING THE GREAT LAKES,
Resources Development Consultants, Inc. Fort Collins, Colo.
For primary bibliographic entry see Field 05B.
W73-11955

AN ACT PROPOSING AN AMENDMENT TO ARTICLE IV, SECTION 93, AS AMENDED, OF THE CONSTITUTION OF ALABAMA RELATIVE TO PROVIDING IRRIGATION AND WATER CONSERVATION IN THE STATE.

Act No 505, Acts of Alabama, p 1229-1230, 1971.

Descriptors: *Alabama, *Constitutional law, *Legislation, Water conservation, Distribution systems, Land development, Water rights, Irrigation programs, State governments, Government finance, Irrigation, Water resources development.

This proposed constitutional amendment provides that when authorized by the Legislature the state may, in promoting and aiding irrigation and water conservation, engage in works of internal improvement by promoting, developing, constructing, maintaining and operating within the state irrigation projects and facilities related thereto, or it may guarantee the repayment of all or a portion of any loans to any body corporate organized for such purposes under the provisions of the Alabama Constitution and pledge to the payment of such loans the full faith and credit of the State. Nothing in the bill authorizes the State, directly or indirectly, to engage in or finance the production, transmission or sale of electric power. The bill also sets out the time and place of the general election to consider passage of this bill. (Mockler-Florida)
W73-11963

DEPARTMENT OF ENVIRONMENTAL QUALITY; EXECUTIVE COMMITTEE.
Iowa Code Ann. secs. 455B.1 thru 455B.9 (Supp. 1973).

Descriptors: *Iowa, *Environmental control, *Legislation, *Waste disposal, *Water quality control, Administrative agencies, Environment, Air environment, State governments, Governments, Management, Regulations, Solid wastes, Chemical control, Administration, Comprehensive planning, Project planning, Pollution control, Inter-agency cooperation.

The Iowa Department of Environmental Quality (Department) is created, to be headed by an Executive Director (Director). The Director shall recommend the adoption of rules designed to implement the programs and services of the Department, as well as facilitate administration of the Department. He shall also contract with the public agencies of the state to provide all services necessary to implement this section. Within the Department, the Air Quality Commission, Water Quality Commission, Chemical Technology Commission and Solid Waste Disposal Commission are created. Each Commission shall advise, consult and cooperate with other Commissions, agencies and political subdivisions to accomplish its responsibilities. An executive committee composed of the

Chairmen of the four commissions and others shall review the rules proposed by the Executive Director and adopt those deemed necessary, and shall also insure integration and cooperation of the programs administered by the Department. Provisions for the organization, administration, and financing of the Department and the four commissions within the Department are included. (Glickman-Florida)
W73-11964

THE SEABED ARMS CONTROL TREATY: A STUDY IN THE CONTEMPORARY LAW OF THE MILITARY USES OF THE SEAS,
P. S. Rao.
Journal of Maritime Law and Commerce, Vol 4, No 1, p 67-92, October 1972.

Descriptors: *Treaties, *Law of the sea, *United Nations, *International waters, *Military aspects, Water law, International law, Jurisdiction, Legal aspects, Oceans, Political aspects, Continental shelf, Navigation.
Identifiers: Coastal waters, Contiguous zone.

The Seabed Arms Control Treaty was approved by the United Nations in 1970. The prohibitions agreed upon exclude all of the important contemporary military uses of the sea. The parties to the treaty will have the right to observe all seabed installations in the normal course of the exercise of the freedom of navigation. One value of the treaty lies in the classification of the status of several military uses of the seas. This comes at a time when the entire body of the contemporary law of the sea has been undergoing reexamination. During negotiations surrounding the ocean arms control measures different claims regarding the permissibility or impermissibility of certain kinds of military uses of the sea were considered. An attempt has been made to resolve the conflicts between the right of freedom to the high seas and the exclusive rights granted to the coastal states over the continental shelves. Through May 1972 some thirty-five nations (listed herein) had ratified the treaty. (Mockler-Florida)
W73-11965

DRAINAGE UNDER STATE LAWS (MINNESOTA AND ARKANSAS).

43 U.S.C. secs. 1021 thru 1048 (1970).

Descriptors: *Drainage, *Governmental interrelations, *State jurisdiction, *United States, *Legislation, Federal government, Water resources development, Jurisdiction, Legal aspects, Reserved lands, Water rights, Land use, Drainage programs, Drainage systems, Flood control, Water management (Applied), Public lands, Federal jurisdiction, Indian reservations, Arkansas, Minnesota.

All of the unentered, unreserved public lands and all of those entered lands in Minnesota and Arkansas for which no final certificates have been issued are made subject to the laws of the state in which they are located. However, it is also provided that the United States and all persons holding unpatented lands under entries made under the public land laws of the United States shall be accorded all the rights given by the state laws to persons holding lands in private ownership. In addition to the subjection of these lands to state laws for drainage for agricultural purposes, the statutes also provide for apportionment of the costs, patents, transfer of lands, issuance of patents, claims, imposition of liens or assessments on federal lands or any ceded or other Indian lands, title to lands, consent of owners of Indian lands, homestead rights, all lands not affected, and canals, ditches, levees, and other drainage works. Moreover, a complete breakdown on the transfer of various functions from federal agencies to the states is also provided. (Mockler-Florida)
W73-11966

BRICKELL V. TRAMMELL (TITLE SUIT TO DETERMINE OWNERSHIP OF SUBMERGED LANDS ALONG NAVIGABLE BODY OF WATER).
82 So. 221-230 (Fla. 1919).

Descriptors: *Florida, *Navigable waters, *Public rights, *Judicial decisions, *Riparian rights, Submerged lands, Equity, Common law, Legal aspects, Water rights, Ownership of beds, High water mark, Watercourses (Legal aspects), Low water mark, Boundaries (Property), Easements, Tidewaters, Channels, Bulkheads, Beds, Legal review.
Identifiers: *Injunctions (Prohibitory), Sovereign states, Title disputes (Submerged land), Constitutional effects (Federal), Trustees of the Internal Improvement Fund.

Appellant, riparian landowner, claimed fee simple ownership to portions of submerged land extending to the natural channel of Biscayne Bay and to a certain partially submerged tract or island. She alleged that certain dredge and fill activities had rendered the submerged lands navigable, and that over her objections appellees, the Trustees of the Internal Improvement Fund, had sold, but not delivered, the deed to the partially submerged island to a third party. Appellant requested an injunction restraining delivery of such deed and that the trustees be adjudged unauthorized to sell such island. The complaint did not exhibit paper title from any sovereignty. Appellant claimed here predecessors in title had such fee simple title by virtue of an 1856 legislative act. The court held for the trustees. It held that the 1856 act only granted easements to those riparian owners who owned property to the high water mark, and that all other submerged lands were owned by the sovereign state. There was nothing in the title to the original grantor that indicated she received title to said low water mark, no adequate proof of such ownership by the complainant. The state of Florida was found to hold the submerged property in trust for the people of the state, and the trustees could properly dispose of same. (Smith-Adam-Florida)
W73-11967

BURNS V. COASTAL PETROLEUM COMPANY (ACTION TO DETERMINE WHETHER BOTTOM OF LAKE WAS INCLUDED WITHIN OIL AND MINERAL LEASE).

194 So. 2d 71-76 (1st D.C.A. Fla. 1966).

Descriptors: *Florida, *Leases, *Oil industry, *Lake beds, Legal aspects, Adjacent landowners, Contracts, Judicial decisions, State jurisdiction, Legal review, Exploration, Flow channel flow, Legislation, Gulf of Mexico, Boundaries (Property), Oil fields, Mining.
Identifiers: *Legislative interpretation, Trustees of the Internal Improvement Fund (Florida).

Appellants, Trustees of the Internal Improvement Fund, appealed from a declaratory decree holding that the water bottom of Lake Hancock was included within an oil and mineral lease executed by the Trustees to appellees, Coastal Petroleum Company. The court found that oil and mineral rights were not so conveyed. The contract and lease had not been intended to include all state-owned water bottoms which were connected by natural streams to certain named rivers. Extrinsic evidence was disallowed as the lease was sufficiently definite on its face, and the lease documents meant exactly what they said; that is, that the water bottoms covered included only those rivers and lakes named therein. A petition for rehearing was filed which was denied. (Smith-Adam-Florida)
W73-11968

WATER RIGHT CHANGES TO IMPLEMENT WATER MANAGEMENT TECHNOLOGY,
Colorado State Univ., Fort Collins.
G. E. Radosevich.
In: Managing Irrigated Agriculture to Improve Water Quality, Proceedings of National Conference on Managing Irrigated Agriculture to Improve Water Quality, Colorado State University, May 16-18, 1972. p 265-279, (1972) 27 ref.

Descriptors: *Water rights, *Prior appropriation, *Water management (Applied), *Water distribution (Applied), *Water quality control, Irrigation, Agriculture, Legal aspects, Administration, Comprehensive planning, Water law, Irrigated land, Water allocation (Policy), Institutional constraints, Technology, Judicial decisions.

The institutionalization is explored of a legal and organizational system that has directed the course of allocation, distribution and utilization of water in semi-arid western states. One of the dominant features of this system is the concept of a property right in water. This property right concept is at the root of current water problems; through the exercise of this right, not only the quantity but also the quality of water is affected. Both of these aspects are an integral part of effective water management and are discussed. A general discussion of the appropriation doctrine and the nature of the water right concept is included; however, the crux lies with the call for a reassessment of present legal and organizational machinery in light of water demands, water use practices and technological innovation. Changes in the exercise of water rights to induce or require more efficient uses of the resource must and can be made. The water problems of the western states demand a new, flexible and pragmatic solution. (Mockler-Florida)
W73-11969

PROCEDURAL REGULATIONS OF THE NEW ALABAMA WATER IMPROVEMENT COMMISSION,
Union Bank and Trust Co., Montgomery, Ala.
H. A. Leslie.
Alabama Lawyer, Vol 34, p 72-79, Jan 1973. 3 ref.

Descriptors: *Alabama, *Adjudication procedure, *Water pollution control, *Administrative agencies, Water quality standards, Pollution abatement, Regulation, Waste disposal, State governments, Effluents.
Identifiers: *Administrative regulations, *Alabama Water Improvement Commission.

Procedural Regulations of the Alabama Water Improvement Commission were adopted on May 29, 1972. The commission was a product of public demand for strengthening laws relating to water pollution. The regulations provide, among other things, that the Commission shall: adopt regulations establishing water quality standards, adopt effluent limitation guidelines, stream classifications, and any other regulations necessary to control pollution in state waters. All rules and other written statements of policy or interpretations formulated are to be made available for public inspection as are all final orders, decisions, opinions, records, reports or information. Adoption, amendment or repeal of regulations may be formally proposed by a member of the Commission, Chief Administrative Officer, Commissioner of Department of Conservation and Natural Resources, Commissioner of Agriculture and Industries, the State Geologist, the Director of the Alabama Development Office, Attorney General or by petition of 50 or more citizens of the state. The regulations conclude with procedures for adoption of new regulations. (Napolitano-Florida)
W73-11970

UTILIZATION OF GROUND WATER RESOURCES.

La. Rev. Stat. secs. 38:3091 thru 38:3097 (Supp. 1973).

Descriptors: *Louisiana, *Legislation, *Groundwater resources, *Well regulations, *Groundwater mining, Water management (Applied), Water wells, Wells, Administrative agencies, Administrative decisions, Legal aspects, Comprehensive planning, Penalties (Legal), Water supply, Water yield, Regulation, Inspection, Water policy, Water rights, Control systems, Water sources, Subsurface waters.

The Director of the Louisiana Department of Public Works is required to make reasonable rules and regulations regarding the registration of water wells and classification of their use, renewal and application for such registration, to establish regulations regarding the construction of certain water wells, to gather data with respect to existing and future flowing wells, and to regulate the abandoning and sealing of such wells. The director is given authority to hold hearings, to collect data, to authorize personnel to make property inspections, to receive grants and enter into contracts for ground water resources development, to conduct studies in this area, to require the keeping of records regarding use of ground water, and to cooperate with other governmental units to achieve water conservation. Penalties for the violation of provisions under this chapter are set forth. (Dunham-Florida)
W73-11971

KANSAS-NEBRASKA BIG BLUE RIVER COMPACT.
Hearing--Subcomm. on Water and Power Resources--Comm. on Interior and Insular Affairs, U.S. Senate, 92d Cong. 2d Sess, February 23, 1972. 48 p.

Descriptors: *Governmental interrelations, *Interstate compacts, *River basin development, *Appropriation, Federal government, Kansas, Nebraska, Legislation, Administrative agencies, Interstate rivers, Water law, Legal aspects, Administration, Water resources development, Comprehensive planning, Water supply, Water pollution control, Water rights, Priorities, Preferences (Water rights), Interstate Commissions.
Identifiers: *Congressional hearings, *Big Blue River (Kansas and Nebraska).

Hearings were held to take testimony on proposed legislation to consent to the Kansas-Nebraska Big Blue River Compact which was already ratified by the two states. The compact is designed to apportion the waters of the Big Blue River Basin between Kansas and Nebraska, to promote the orderly development of these waters, and to reduce water pollution. The compact creates a compact administration composed of representatives of each state and a non-voting federal member to administer the compact and specifies its functions. Restrictions on water rights and use are placed on both states for their mutual benefit. Included are texts of both Senate and House bills consenting to the compact, reports from interested federal agencies, and statements and testimony of witnesses at the hearing. (Dunham-Florida)
W73-11972

MARINE SANCTUARIES IN CALIFORNIA.

Hearings--Subcomm. on Minerals, Materials, and Fuels--Comm. on Interior and Insular Affairs, U.S. Senate, 92d Cong, 1st Sess, November 1 and 4, 1971. 163 p, 1 plate.

Descriptors: *Legislation, *Continental shelf, *Mineral industry, *Beds under water, Oil, Water pollution control, Legal aspects, Tidal waters, Beds, Mining, Environmental effects, California, Leases, Oceans, Federal jurisdiction.
Identifiers: *Outer Continental Shelf Lands Act, *Congressional hearing.

Testimony was taken on legislation which would create seven marine sanctuaries pursuant to the Outer Continental Shelf Lands Act in areas off the coast of California adjacent to state-owned submerged lands in which the state has already suspended leasing for mineral purposes. Specifically, the purpose of the bill is to create the marine sanctuaries along 250 miles of California Outer Continental Shelf lands, to suspend leasing activities over such lands and to establish a congressional policy with regard to such lands. The legislation provides that the Secretary of the Interior shall suspend all further leasing pursuant to the Outer Continental Shelf Lands Act for the exploration for or extraction of oil, gas, or any other mineral in the portion of the Outer Continental Shelf. Such suspension could be terminated by the President in the event of a declared national emergency; nothing in the act would be deemed to authorize the Secretary to terminate or refuse to renew any lease, to limit any authority to grant rights-of-way, to prohibit any exploration of the Outer Continental Shelf or to grant to the State of California any title or jurisdiction over any portion of the Outer Continental Shelf. (Mockler-Florida)
W73-11973

COASTAL PLAINS REGIONAL COMMISSION--ANNUAL REPORT, 1972.

(1972) 28 p, 25 photo, 1 chart.

Descriptors: *Estuaries, *Atlantic Coastal Plain, *Area redevelopment, *Fish management, *Shellfish farming, Water pollution control, Conservation, Shore protection, Coastal marshes, Fishing, Research and development, North Carolina, Georgia, South Carolina, Grants, Governmental interrelations, Interstate commissions, Federal government, Government finance.

The Coastal Plains Regional Commission's primary task is to plan and implement an attack on the economic conditions which cause an annual loss of over five billion dollars in income to the residents of North Carolina, South Carolina, and Georgia. This report of the Commission's activities covers the period of July 1, 1971 through June 30, 1972. Six hundred miles of coastline and millions of acres of relatively unpolluted estuaries is the region's greatest natural asset. The Commission opened fiscal year 1972 with a $2.4 million grant to help finance construction of a multi-purpose marine resource center in North Carolina, the dedication of the Fort Johnson Marine Resources Center in South Carolina, and for construction of a shell fish facility on Skidaway Island in Georgia. A clam hatchery and oyster-culture operation in North Carolina also received continued Commission support. In addition, the Commission contributed $100,000 to assist the expansion of South Carolina's Bonneau Fish Hatchery and donated $59,000 for an analysis of the structure and marketing practices of the sea food industry. (Mockler-Florida)
W73-11974

SABINE RIVER AUTHORITY.
La. Const. art. 14 sec. 45 (Supp. 1973).

Descriptors: *Louisiana, *Constitutional law, *River basin commissions, *Watershed management, River basin development, Navigation, Flood control, Agriculture, Irrigation, Recreation, Planning, Land management, Legislation, Jurisdiction, Drainage, Hydroelectric power, Governmental interrelations, Water supply development.

The Sabine River Authority is created as an approved instrumentality and agency of the state of Louisiana. Jurisdiction of the authority shall include those parishes or portions of parishes as the legislature may determine, with the view of improving navigation on the Sabine River and its tributaries, providing for adequate drainage and flood control within the Sabine River and the Calcasieu River watersheds, thus utilizing the waters of the Sabine River and its tributaries for the purpose of providing recreation and irrigation, attracting industry to the area, maintaining an adequate water supply for agricultural, municipal, domestic, and industrial use in the Sabine and Calcasieu River watersheds, and for the development of hydroelectric power. The Authority shall be fully authorized to cooperate financially with the U.S. government, the state of Texas and Louisiana and with any political subdivision or agency of these states, as well as the federal government. (Mockler-Florida)
W73-11975

POLLUTION CONTROL UNDER THE PENNSYLVANIA CLEAN STREAMS LAW,
A. Charlson.
University of Pittsburgh Law Review, Vol 34, p 115-129, Fall 1972. 51 ref.

Descriptors: *Pennsylvania, *Mine wastes, *Judicial decisions, *Legislation, Water pollution control, Legal aspects, Waste water disposal, Water quality standards, Law enforcement, Water policy, Mine drainage, Mine water, Water pollution sources, Permits.

The authority of the Commonwealth of Pennsylvania under the Clean Streams Law to control mine drainage pollution has been severely limited in two recent decisions of the Commonwealth Court. In one case, the court held that the operator of an active mine could not be compelled by the Commonwealth to treat polluted water which it pumped from an adjacent inactive mine for the purpose of protecting its active workings. It was held in this case there was no 'mine' within the applicable statutory provision. In the second case polluted water flowed underground from inactive workings into an active mine, commingled with other waters, and subsequently was discharged together with water originating in the active mine. The Court there held there was no 'mine drainage' within the statute and thus no violation of the statute. The court has also required a more stringent standard of fault than is necessary in a system which regulates effluent quality. The Commonwealth Court has erred in its strict interpretation of the Clean Streams Law in these two decisions; there is no reason that liability should not attach every time there is a waste discharge into the waters of the Commonwealth. (Mockler-Florida)
W73-11976

BOWIE DAM AND LAKE PASCAGOULA RIVER BASIN, MISSISSIPPI AND ALABAMA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 08A.
W73-11977

FLOOD AND EROSION CONTROL.

Iowa Code Ann. secs. 467B.1 thru 467B.15 (1971).

Descriptors: *Iowa, *Flood control, *Soil conservation, *Water conservation, *Legislation, Water policy, Federal government, Local governments, Governmental interrelations, Flood protection, Soil erosion, Public health, Water resources development, Government finance, Grants, Levees, Structures, Federal project policy, Water management (Applied).

Whenever any political subdivision or agency of the state of Iowa shall engage in any project for flood or erosion control, flood prevention or the conservation, development and disposal of water in cooperation with the federal government, the counties in which the project is carried on shall have the authority through the Board of Super-

visors to maintain that project on county lands. Any county may accept federal funds for any such project. The various governamental units involved in these projects may consult and cooperate with each other. When structures or levees necessary for flood or soil conservation control are constructed on county roads, they shall be considered part of the cost of road construction. When projects have been completed on private lands under easement granted to the county, the cost of maintenance may be assumed by the county. Conservation commissioners shall inspect all flood and erosion control structures. Funds received from the federal goverament because of operations of federal flood control projects shall be allocated between schools, roads and other functions. (Glickman-Florida)
W73-11978

SOIL CONSERVATION AND FLOOD CONTROL DISTRICTS.
Iowa Code Ann. secs. 467C.1 thru 467C.6 (1971).

Descriptors: *Legislation, *Flood control, *Iowa, *Soil conservation, Natural resources, Water resources, Erosion control, Soil erosion, Water conservation, Surface waters, Public health, Water policy, Water management (Applied), Strip mines, Drainage districts, Water districts, Levee districts, Flood protection, Water resources development, Land use, Coal mines.

The conservation of the soil resources, the proper control of water resources, flood prevention and the drainage of surface waters shall be a considered public benefit, conducive to the public health and welfare of the state of Iowa. The County Board of Supervisors (Board) may create districts for soil conservation and flood control, and shall construct improvements deemed essential to accomplish those purposes. The Board may also supervise strip coal mining, to insure that all surface soil is replaced upon abandonment of any mining operation. These new districts may encompass old levee or drainage districts that wish to be included in the conservation and control projects. No proposed district shall be established without the approval of the commissioners of any soil conservation district included all or in part within the proposed districts. (Glickman-Florida)
W73-11979

AN ACT RELATING TO IRRIGATION AND WATER CONSERVATION.
Act No 980, Acts of Arkansas, p 1750-1752, 1971.

Descriptors: *Alabama, *Legislation, *Irrigation, *Water conservation, *Irrigation programs, Conservation, Distribution systems, Land development, Irrigation districts, Water conveyance, Governmental interrelations, Government finance, Constitutional law, Cost sharing.

This act authorizes the state to provide financial assistance and to underwrite and guarantee costs of a pilot irrigation and water conservation project and related facilities. Moreover, it authorizes the state of Arkansas to create a state irrigation development trust fund and provides for the use of the fund. It also provides that any such project shall remain under the supervision and control of the state until all monies owed are repaid. The act becomes effective upon ratification of an amendment to the Alabama Constitution to authorize the legislature to pass laws authorizing the state to aid in promoting and developing irrigation and water conservation. The state may also enter into agreements with any federal agency directly or through an irrigation district whereby the federal government will render financial assistance to such projects. (Mockler-Florida)
W73-11980

INTERSTATE DRAINAGE DISTRICTS.
Iowa Code Ann. secs. 467.1 thru 467.6 (1971).

Descriptors: *Iowa, *Drainage districts, *Governmental interrelations, *Drainage systems, *Legislation, Drainage area, State governments, Legal aspects, Administrative agencies, Water law, Water policy, Inter-agency cooperation, Bond issues, Contracts, Bids, Comprehensive planning, Project planning, Equitable apportionment, Interstate compacts, Public benefits, Administration, Water management (Applied).

Before the final establishment of a drainage district bordering on the Iowa state line, the authorities of this state may hold a hearing to determine the feasibility of a joint project with the drainage district in a bordering state. The Board of Supervisors shall have the power to enter into an agreement as to amounts the property owners of each state should pay toward construction of the joint undertaking. Acceptance of construction bids must be by both states jointly, although contracts for construction of those portions of the project within the state shall be separate from that of the neighboring state. This state may make agreements with the adjoining state for the joint management, repair and maintenance of such improvements. No bonds shall be issued until all litigation in both states shall have been terminated. (Glickman-Florida)
W73-11981

OPERATION OF WATERCRAFT.
Ind. Ann. Stat. secs. 68-813 thru 68-871 (Supp. 1972).

Descriptors: *Indiana, *Legislation, *Boats, *Boating regulations, Navigation, Transportation, Recreation wastes, Pontoons, Recreation, Regulation, Inspection, Permits, Penalties (Legal), Administration, Legal aspects, Local governments.

Speed limits, disposal regulations, toilet regulations, life preserver requirements and restrictions on the operation of watercraft near shorelines are specified in the statute. The operation of a powered watercraft by children, with certain exceptions, is prohibited. The Indiana department of conservation is authorized to establish speed limits for watercraft and to prescribe areas for special use on lakes and for federal reservoirs financed either wholly or in part with state and/or federal funds. Sitting or standing on gunwales or bow decking and boat racing, with certain exceptions, are prohibited. Lights are required on pontooned boats. The duties of the department are stated in the statute. The department has the authority to promulgate and amend certain rules and regulations. (Reed-Florida)
W73-11982

LITTLE CALUMET RIVER BASIN COMMISSION.
Ind. Ann. Stat. secs. 68-1601 thru 68-1607 (Supp. 1972).

Descriptors: *Indiana, *Legislation, *Water resources development, *River basin commissions, *River basin development, River basins, Planning, Watersheds, River systems, River regulation, Streamflow, Regulation, Comprehensive planning, Land management, Governmental interrelations, State governments, Illinois, Administrative agencies.

The Little Calumet River Basin Commission (Commission) is established for the purpose of coordinating the development of the river basin and shall cooperate with the regional planning commission in the preparation of a comprehensive development plan for the basin. The activity of this Commission is limited to that part of the Little Calumet River Basin which begins at the point where Burns Ditch empties into Lake Michigan and runs southerly and westerly to the Indiana-Illinois state line. The Commission may conduct all necessary studies for the accomplishment of its duties. It may publicize and advertise its purposes, objectives, and findings; may provide recommendations when requested to the political subdivisions within the basin; and may act when requested as a coordinating agency for programs and activities of such agencies as they relate to its objectives. Moreover, the Commission may acquire and use such property as the Commission may deem necessary for the development in the corridor or contiguous areas. Also, the Commission may enter into agreements with duly constituted agencies in Illinois which are responsible for the planning and development of the entire Little Calumet River Basin in Illinois. Provisions relating to Commission membership, administration, and project financing are included. (Mockler-Florida)
W73-11983

GREAT LAKES RIVER BASINS COMMISSION.
Ind. Ann. Stat. secs. 68-1401 thru 68-1404 (Supp. 1972).

Descriptors: *Indiana, *Great Lakes, *River basin development, Water resources development, Water quality control, Planning, Land use, River basins, Water pollution control, *River basin commissions, Comprehensive planning, Administrative agencies, Governmental interrelations, State governments, Interstate commissions, St. Lawrence River, Optimum development plans.

The membership of the state of Indiana in the Great Lakes River Basins Commission, established by a presidential executive order, is ratified. The Indiana member of this Commission is to be appointed by the Governor for an indefinite period and the Department of Natural Resources shall provide administrative, technical and advisory services to the member. The functions and duties of the Commission are to serve as the principal agency for the coordination of federal, state, interstate, local and nongovernmental plans for the development of water and related land resources within those portions of the eight Great Lakes states which are or were in their natural state drained by the St. Lawrence River system; to prepare and keep up to date a comprehensive, coordinated joint plan; and to recommend long-range schedules of priorities for the collection and analysis of basic data and for investigation, planning, and construction of projects. The statutes also provide that the plans shall include an evaluation of all reasonable alternative means of achieving optimum development of water and related land resources of the basins. (Mockler-Florida)
W73-11984

ENVIRONMENTAL HEALTH (CONSTRUCTION SITE REGULATIONS).
Ind. Admin. Rules and Reg. secs. (40-2139)-L74 thru (40-2139)-L81 (Supp. 1972).

Descriptors: *Indiana, *Public health, *Sewage disposal, *Water quality standards, Water quality control, Water sources, Water supply, Water treatment, Waste treatment, Potable water, Safety, Environmental sanitation, Water purification, Administrative agencies, Administrative decisions.
Identifiers: *Administrative regulations, *Construction sites, Potable water standards, Toilet facilities, Washing facilities.

These provisions contain minimum requirements for sanitation and health on construction work sites. The rules cover drinking water standards, water sources, water supply standards for employee washing facilities, drinking water transportation and dispensing, non-potable water sources, water discharge points, toilet and washing facilities, and sewage disposal. The rules provide that the requirements outlined for sanitation and health are minimum requirements and shall not supersede, take precedence, or invalidate any rules,

regulations, orders, or directives of the Indiana state board of health or any other state or local agency that may be more stringent or additional to the requirements stated. An exception to the rules provides that for routine maintenance and repair and nonfixed construction work such as signal and line work, railroad and highway work, and pipeline work, the toilet and washing facilities and the sewage disposal facilities required by the regulations may be waived or varied by the commissioner of labor. (Mockler-Florida)
W73-11985

ENVIRONMENTAL MANAGEMENT.

Ind. Ann. Stat. secs. 35-5201 thru 35-5265 (Supp. 1972).

Descriptors: *Legislation, *Administrative agencies, *Indiana, Water quality control, Water pollution control, Public health, Sewage treatment, Legal aspects, Water resources development, Comprehensive planning, Waste disposal, Adjudication procedure, Administrative decisions, Permits, Law enforcement, Treatment facilities, Water supply, Penalties (Legal).
Identifiers: Administrative regulations.

The Indiana environmental management board (Board shall maintain a long term comprehensive plan for the development and control of the state's natural resources; adopt regulations to protect the environment; inspect refuse disposal sites, public water supplies and pollution sources; and assist local governments in developing programs for such actions as water pollution control. All powers and duties of the state board of health are transferred to the Board; other powers are expressly enumerated. Also included are provisions for Board membership, meetings, adopting rules and regulations and hearings. The Board may prescribe regulations for water wells, drainage holes and standards for waste discharges into waters of the state. Permits for the construction and operation of public water supply facilities and water pollution control facilities must be obtained from the Board. The Board is charged with investigating and enforcing violations of this Article. Provisions for hearings and appeals are included. (Mockler-Florida)
W73-11986

FLOOD CONTROL.

Ind. Ann. stat. secs. 27-1101 thru 27-1134 (1970).

Descriptors: *Indiana, *Legislation, *Flood control, *Flood protection, *Water resources development, Water management (Applied), Floods, Channel improvement, Civil engineering, Flood damage, Water policy, Flood proofing, Water resources, Legal review, Water conservation, Economics, Programs, Project planning, Administration, Legal aspects, Planning, Administrative agencies.
Identifiers: Nuisance (Legal aspects).

The duties and powers of the Indiana Flood Control and Water Resources Commission (Commission) are specified. The Commission has the power to commence, maintain and prosecute any appropriate action to enjoin or abate a nuisance which adversely affects flood control or the safety of life or property. To prevent and limit floods, all flood control works and structures, the alteration of watercourses of all rivers and streams are to be regulated, supervised and coordinated in design, construction and operation according to sound and accepted engineering practice. Channels and floodways are to be kept free of obstructions. Water resources are to be accumulated and preserved. A master plan for the entire state to control floods and preserve the water resources is to be prepared. A flood control revolving fund, from which loans may be made to municipalities, is established. Municipalities are authorized to institute flood control programs in cooperation with state policy and project planning. (Reed-Florida)
W73-11987

BENEFITED WATER DISTRICTS.

Iowa Code Ann. secs. 357.1 thru 357.34 (Supp. 1973).

Descriptors: *Iowa, *Water districts, *Legislation, *Water supply development, Legal aspects, Local governments, Governmental interrelations, Water policy, Water, Water rights, Assessments, Value, Taxes, Management, Administrative agencies, Water resources development, Project planning, Water utilization, Public benefits.

Upon the petition of 25% of the resident property owners, the County Board of Supervisors (Board), shall grant a hearing relative to the establishment of a water district. If the proposed district is to be located wholly within a city or town, the city or town council shall have the authority to establish the water district. If the preliminary design and assessment are approved by the County Board, a date for an election shall be set. The election shall be to determine whether the improvement shall be constructed, and to choose trustees for the district. After a final acceptance of the work by the Board, the engineer shall complete a final assessment based on all the property in the district. The Board of Supervisors may alter an assessment by increasing or decreasing it. Where a town or city is wholly within a benefited water district, the Board having jurisdiction of that district may convey it and all rights in and to it to that city or town. (Glickman-Florida)
W73-11988

UPPER MISSISSIPPI RIVERWAY COMPACT.

Iowa Code Ann. secs. 27A.1 thru 27A.6 (Supp. 1973).

Descriptors: *Iowa, *River basin development, *Legislation, *Interstate compacts, *Mississippi River, River basin commission, Natural resources, Rivers, Legal aspects, Legislation, Administrative agencies, Ecology, Recreation, Recreation facilities, Fishing, Social needs, Wildlife, Water resources, State governments, Governmental interrelations, Management, Public benefits, Public lands, Interstate rivers.
Identifiers: Public trust doctrine.

The Upper Mississippi Riverway Compact is established and entered into by all adjoining states. The purpose of the compact is to secure the benefits that can accrue from the preservation, use and development of the scenery, recreational opportunities, fisheries, wildlife, water resources and other natural assets of the river. The party states shall cooperate in preserving and protecting the natural and recreational resources of the area. The Upper Mississippi Riverway District (District) is established, to be managed by the Upper Mississippi Riverway Commission (Commission). The Commission shall have the power to operate all recreational facilities within the District and to conduct studies and develop recommendations for the protection, use, and development, in the public interest, of the lands and waters in and affecting the District. The Commission may acquire easements or make such agreements that may be suitable for establishing patterns of land and water use consistent with this compact. The Commission may enter into necessary agreements with any agency of the State of Iowa, but none of the functions of the Riverway District shall limit the powers of governmental units within the state. Provisions are included for the administration of the Commission and financing of Commission projects. (Glickman-Florida)
W73-11989

PROTECTION FROM FLOODS.

Iowa Code Ann. secs. 395.1 thru 395.35 (Supp. 1973).

Descriptors: *Iowa, *Condemnation, *Flood control, *Legislation, Watercourses (Legal aspects), Flood damage, Flood routing, Diversion structures, Flood protection, Structure, Levees, Floodways, Floodproofing, Bond issues, Right-of-way, Assessments, Governmental interrelations, Cities, Public health, Water management (Applied), Water policy, Financing, Project planning.

Cities and towns are authorized to establish a flood control system for the protection of property within their limits from floods and their effects. They may alter watercourses by improving and widening watercourses or other projects designed for flood control. Cities and towns may purchase or condemn private property as well as rights-of-way if it is necessary to carry out the provisions of this chapter. The title of all property condemned to establish a flood control system shall be taken in the name of the city or town; and, if the land is later sold, the proceeds shall be credited to the flood control system. To pay for the cost of contemplated improvements, bond issues are authorized. In addition, the cities and towns may accept federal aid in developing their systems. City Councils shall be allowed to allocate portions of the street fund to the project, as well as authorizing special assessments against real property. The work to be done may be divided into sections, and each section may be developed separately. Cities and towns are also authorized to issue bonds to pay expenses. (Glickman-Florida)
W73-11990

WATER QUALITY COMMISSION.

Iowa Code Ann. secs. 455B.30 thru 455B.74 (Supp. 1973).

Descriptors: *Iowa, *Water pollution control, *Water quality standards, *Waste water (Pollution), Administrative agencies, Legislation, Water quality, Regulation, Water pollution, Water policy, Water quality control, Public health, Pollution abatement, Waste water disposal, Waste water treatment, Law enforcement, Permits, Sewage treatment, Financing, Detergents, Legal review, Legal aspects, Personnel.
Identifiers: Licenses.

The Iowa Water Quality Commission (Commission) shall develop comprehensive plans and programs for the prevention, control and abatement of water pollution. It shall establish water quality standards for the water of the state, as well as develop rules specifying the conditions under which the Commission shall issue or deny permits for the installation or operation of disposal systems for the discharge of sewage or other wastes. The Commission shall implement rules governing the labeling of detergents which contain phosphorous. The Commission shall hold hearings on the implementation and enforcement of the rules it establishes. The Executive Director shall classify water treatment plants or water distribution systems in accordance with the skill and experience an operator must have to run the plant so as to protect the public health and prevent pollution, and every operator must be certified to handle his particular position. No plant shall operate except under the direction of a certified operator. The Commission shall administer the Sewage Works Construction Fund, giving consideration to the public benefit and ultimate cost of any project. (Glickman-Florida)
W73-11991

MILLDAMS AND RACES.

Iowa Code Ann. secs. 469.1 thru 469.31 (1971).

Descriptors: *Iowa, *Mill dams, *Water pollution control, *Legislation, *Legal review, Embankments, Regulation, Water policy, Dams, Environmental effects, Riparian rights, Public health, Permits, Water pollution, Water quality control, Industrial wastes, Mills, Legal aspects, Dam construction, Dam design, Administrative decisions, Administrative agencies, State governments, Water management (Applied).
Identifiers: *Races.

No dam shall be constructed or maintained in any navigable stream, or in any other stream for manufacturing or power purposes, nor shall any water be taken from such streams for industrial purposes unless a permit has been granted by the Iowa Natural Resources Council. Upon application for a permit and a hearing, if it appears that the dam will not obstruct existing navigation or affect other public rights, or endanger public health, the Council shall grant the permit. If water is to be used for manufacturing purposes, application must be approved by the Water Pollution Control Commission. The Natural Resources Council shall investigate means of constructing and maintaining dams so as to best conserve and protect all public and riparian rights. When the water backed up by a dam belonging to a mill is about to overflow the banks and injure machinery, the owner of the mill may repair the embankments to prevent the damage. Any person using a water power for the purpose of propelling machinery shall have the right to acquire the fall below such power. Specific provisions relating to the procedure for receiving a permit to construct a dam are included. Penalties for non-compliance with the chapter are also provided. (Glickman-Florida)
W73-11992

BIG CYPRESS PRESERVE, FLORIDA.

Hearings-Subcomm. on National Parks and Recreation--Comm. on Interior and Insular Affairs, U.S. House of Representatives, 92d Cong, 2d Sess, February 15 and September 26, 1972. 180 p.

Descriptors: *Watershed management, *Legislation, *Eminent domain, *Water management (Applied), Water quality control, Freshwater, Wetlands, Water supply, Water sources, Federal jurisdiction, Condemnation, Land management, Land use, Water conservation, Surface drainage, Swamps, Florida, Land development, Environmental effects.
Identifiers: *Environmental Impact Statements, *Big Cypress Swamp, *Congressional hearings, Everglades.

H.R. 10410 would authorize the Secretary of the Interior to acquire certain lands within the Big Cypress watershed in Florida; other bills would authorize the acquisition of the Big Cypress national fresh water reserve in Florida. The basic purpose of this field hearing was to hear testimony from people in the local area. Representatives of state and local agencies testified at this hearing with reference to these proposed bills. Upon passage, the Secretary of the Interior would be authorized to enter into an agreement with the state or local unit of government for the purposes of managing and administering the area. The use of the lands would be limited so as to assure the flow of fresh water into the park. The use of motorized vehicles, mineral exploitation, grazing, and agricultural pursuits would be closely regulated. Hunting and trapping would continue subject to reasonable controls. The aim of the proposal is to protect the fresh water resources in Big Cypress Watershed and thereby protect the water quality, quantity and flow regimen to the northwest portion of Everglades National Park, as well as the estuarine regions and the water supplies of the cities and towns in Southwest Florida. (Mockler-Florida)
W73-11993

DEEP DRAFT HARBOR AND TERMINAL AUTHORITY.

La. Rev. Stat. secs. 34:3101 thru 34:3114 (Supp. 1973).

Descriptors: *Louisiana, *Legislation, *Harbors, *Port authorities, *Environmental effects, Coastal structures, Transportation, Shore protection, Coastal engineering, Deep water, Regulation, Governmental interrelations, Navigation, Ships, Project planning, Comprehensive planning, Administrative agencies, Public benefits.
Identifiers: *Deep draft harbors.

The object is to provide for the creation of the Deep Draft Harbor and Terminal Authority (Authority) possessing full corporate powers, to promote, plan, finance, develop, construct, control, operate, manage, maintain and modify a deep draft harbor and terminal within the jurisdiction of this Authority in order to promote the economic welfare of state citizens and to provide the necessary facilities for docking, loading, and unloading of vessels carrying liquid or dry bulk and energy cargoes. Additional purposes include the promotion of port operations, the protection of environmental values and Louisiana's coastal marshland ecosystem, and the promotion of the industrial and petrochemical base of the Mississippi Valley region of the United States by providing adequate deep draft port facilities for the handling of the cargoes of deep draft vessels. Following a list of applicable definitions, the statutes cover jurisdiction, terms and qualifications of Board of Commissioners to govern the authority, board duties, annual reports, public contracts, and procedures for issuance of bonds. A detailed environmental protection plan is required to be prepared and followed in the carrying out of any Authority project. (Mockler-Florida)
W73-11994

JACKSON-BIENVILLE PARISHES DUGDEMONA WATERSHED DISTRICT.

La. Rev. Stat. secs. 38:3000 thru 38:3014 (Supp. 1973).

Descriptors: *Louisiana, *Legislation, *Watershed management, *Water yield improvement, *Water districts, Water conservation, Water use, Water utilization, Water management (Applied), Watersheds (Basins), Water supply, Water storage, Soil management, Soil conservation, Wildlife management, State governments, Area redevelopment, Project planning, Artificial lakes, Public benefits.

The Jackson-Bienville Parishes Watershed District (District) is created for the purpose of soil and water conservation, development of natural resources, and for the creation and maintenance of a lake for the benefit and health of the citizens of the state. The District shall constitute a body corporate and shall be a state agency. The District shall be governed by a Board of Commissioners, (Commissioners), who are empowered to buy and sell land, contract for projects, create administrative rules and regulations, and levy taxes in fulfilling their obligations under these provisions. Specific procedures relating to the imposition of taxes are set forth. The Commission is particularly directed to preserving and improving available fresh water supplies in the area encompassed by the newly created district; it is authorized to cooperate with other governmental agencies in areas such as recreational facilities, fish and wildlife management, and budgetary matters. (Dunham-Florida)
W73-11995

GREATER BATON ROUGE WATER CONSERVATION DISTRICT.

La. Rev. Stat. secs. 38:3051 thru 38:3057 (Supp. 1973).

Descriptors: *Louisiana, *Legislation, *Groundwater resources, *Water districts, *Water management (Applied), Administrative agencies, Regulation, Legal aspects, Comprehensive planning, Project purposes, Local governments, Water supply, Water yield, Water utilization, Water policy, Control systems, Subsurface waters, Encroachment, Water conservation, Ecology, Environmental effects.

The governing body of the parish of East Baton Rouge, Louisiana is empowered to create a special conservation district within the parish and a Water Conservation Commission (Commission) to administer and regulate such conservation district. The Commission is empowered to study groundwater conditions with the view of water conservation, particularly on the possible effects of salt water encroachment, and to determine ways and means of protecting groundwater conditions in all aspects, including depletion and detrimental salt water encroachment. Consideration shall be given to the requirements of industry, agriculture and domestic consumption. The Commission shall make appropriate recommendations for any preventive or remedial action. Provisions for the make-up of the Commission membership, expansion of the special conservation district to other parishes, cooperative agreements with other governmental units, and technical assistance are included. (Dunham-Florida)
W73-11996

BREVARD COUNTY BEACH EROSION CONTROL PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08A.
W73-11997

ENVIRONMENTAL LAW ABSTRACTS, VOLUME II,
Oak Ridge National Lab., Tenn. Environmental Information Systems Office.
For primary bibliographic entry see Field 10C.
W73-11998

KEHOE LAKE, TYGARTS CREEK, KENTUCKY (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Huntington, W. Va.

Available from National Technical Information Service, as EIS-KY-72-5290-F, $6.00 in paper copy, $1.45 in microfiche. May 12, 1972. 53 p, 2 map.

Descriptors: *Environmental effects, *Dam construction, *Kentucky, *Dams, *Flood control, Water quality control, Watershed management, Recreation, Public rights, Erosion, Reservoirs, Permits, Administrative agencies, Project planning, Project purposes, Flood routing, Forest management, Federal project policy.
Identifiers: *Environmental Impact Statements, *Kehoe Lake, Tygarts Creek (Ky).

The construction and operation of a dam and other facilities for flood control, recreation, fish and wildlife enhancement, and water quality control purposes is analyzed. The construction would affect Kehoe Lake and Tygarts Creek in Carter and Greenup Counties, Kentucky. Construction would regulate downstream flow, convert the stream and upland areas to a lake and change land use both downstream and in the lake area. Adverse environmental effects include loss of cropland and forest land and some types of biotic habitat, disruption of persons now residing on lands to be acquired, and temporarily increased erosion and sedimentation due to construction. Tax revenues from project lands would be lost until economic activity is increased by the project. Alternatives discussed are construction of other main stem reservoirs, construction of retarding dams on minor tributaries,

construction of local flood protection projects, diversion of flood waters, evacuation of the flood plain, regulation of the flood plain, and no development at all. Comments were received, among others, from the Bureau of Sport Fisheries and Wildlife, the Environmental Protection Agency and the Kentucky Department of Parks. (Smith-Adam-Florida)
W73-11999

RICHARDSON V. SCHNEIDER (ACTION INVOLVING DISPUTE AS TO OWNERSHIP OF PENINSULA WHICH JUTTED INTO LAKE).

298 A.2d 583 (N.H. 1972).

Descriptors: *Boundary disputes, *Boundaries (Property), *New Hampshire, *Judicial decisions, Legal aspects, Land tenure, Riparian land, Adjacent land owners, Adverse possession, Prescriptive rights.

Plaintiff landowner sued defendant adjacent landowner to determine the ownership of a peninsula which jutted into a lake bounding the landowner's property. The appeals court held that the evidence revealed the lower court's finding to be erroneous and remanded the case. The appellate court found that the boundary line between the plaintiff's and defendant's property hit the shore of the lake on the defendant's side of the peninsula and that as a result the peninsula, except for a small piece of land, belonged to the plaintiff. However, the court also found that the evidence supported the finding that the defendant, whose family had built and occupied a camp on the peninsula, had gained title to this land through adverse possession. The case was remanded for a further hearing as to the exact extent of the defendant's ownership of land through adverse possession. (Mockler-Florida)
W73-12000

MCMULLEN V. RAMSEY STOCK FARMS, INC. (LANDOWNERS RIGHT TO DRAIN BOTTOMLANDS OR NON-NAVIGABLE LAKE).
272 So.2d 844 (Fla. App. Ct. 1973).

Descriptors: *Reasonable use, *Florida, *Drainage, *Water control, *Water rights, Water law, Water policy, Judicial decisions, Legal aspects, Canals, Dikes, Ditches, Drainage engineering, Drainage systems, Recreation, Beds, Dry beds, Lake beds, Riparian rights, Wetlands.

Plaintiff landowners sought to restrain defendant landowner from ditching, diking and draining operations on a portion of an area known as Lake Levy. Levy Lake is not navigable; in fact, some evidence indicates that it is not actually a lake. The defendants were constructing the dikes and canals on their bottom lands in order to bring them under effective water control, and to use the controlled land to graze cattle. The plaintiffs use the lands mostly for hunting and fishing. The appellate court affirmed the trial court's decision for defendants and held that the actions of the defendants were not causing water to be drained from area bottom lands owned by the plaintiffs. In view of the fact that the actions of defendants were necessary for proper development of their lands and constituted a reasonable use of such lands, the diking and ditching operations were held not to unreasonably interfere with plaintiffs' rights. Plaintiffs had to go upon defendants' lands to reach any open waters anyway. (Glickman-Florida)
W73-12001

SOIL CONSERVATION.
Ark. Stat. Ann. secs. 9-901 thru 9-938 (Supp. 1971).

Descriptors: *Arkansas, *Erosion control, *Soil conservation, *Legislation, *Sediment control, Conservation, Erosion, Floods, Water resources development, Land use, Dams, Watershed management, Administration, Flood control, Land management, Administrative agencies.

In order to control and prevent soil erosion and floodwater and sediment damages, and to further the conservation, development, and utilization of soil and water resources and the disposal of water, it is necessary that land use practices contributing to soil wastage and soil erosion be discouraged and discontinued. Among the works of improvement and procedures needed are engineering operations such as the construction of terraces, terrace outlets, check dams, desilting basins, floodwater retarding structures, channel improvements, floodways, dikes, ponds, ditches, and the like. Provisions for the creation of soil conservation districts and plans, their governing bodies, adoption of improvement plans, and the mechanics of preliminary surveys are included. Moreover, guidelines for the levy and assessment of taxes, borrowing money, and security bonds are also provided for. All improvement plans shall be approved by and recorded with the appropriate county court. (Mockler-Florida)
W73-12002

WATER AND AIR POLLUTION CONTROL ACT.
Ark. Stat. Ann. secs. 82-1901 thru 82-1991 (Supp. 1971).

Descriptors: *Arkansas, *Legislation, *Water resources development, *Water pollution control, Environmental protection, Water quality control, Air pollution, Sewage disposal, Industrial waste, Public health, Water policy, Water management (Applied), Administrative agencies, Regulation, Comprehensive planning, Legal aspects, Legal review, Governmental interrelations, Ecology, Environmental effects, Financing.
Identifiers: *Air pollution control, Administrative regulations, Nuisance (Legal aspects).

In an effort to preserve and protect the quality of the Arkansas environment the Arkansas Water and Air Pollution Control Act was created to correct inadequate state control and regulation. The statutes cover the establishment of the Pollution Control Commission and its powers and duties, procedures for hearings and appeals, criminal penalties for various violations, operation of disposal systems, cooperation among agencies and political subdivisions, public nuisance, permit procedures with reference to disposal systems, authorization to make grants, and application procedures to receive grants. Also covered are revenue bonds, indenture provisions, maximum interest rates, execution of bonds, sources of repayment, tax exemptions, legal investments, disposition of bond sale proceeds, revenue bond redemption, and accelerated project funding . The statutes spell out the state's policy on air pollution and provide a framework for implementing the state's water and air pollution policies. The stated legislative intent indicates that the pollution of the waters in Arkansas from sewage, industrial waste, garbage, municipal refuse, and many other sources has created and is creating a hazard and danger to the public health of the people of Arkansas and that an emergency exists with reference to this problem. (Mockler-Florida)
W73-12003

LEGAL PROBLEMS IN REGULATING FLOOD HAZARD AREAS,
National Water Commission, Arlington, Va.
For primary bibliographic entry see Field 06F.
W73-12004

SURVEYS REQUIRED TO DESIGN NONSTRUCTURAL MEASURES,
Georgia Inst. of Tech., Atlanta.
For primary bibliographic entry see Field 06F.
W73-12005

STATE WATER RIGHTS LAWS,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
W. R. Walker.
Preprint No. 1908, American Society of Civil Engineers, National Water Resources Engineering Meeting, Washington, D.C., January 29-February 2, 1973. 12 p. Price: $0.50.

Descriptors: *Water rights, *Water allocation, *Prior appropriation, *Water law, Competing uses, Appropriation, Beneficial use, Legal aspects.
Identifiers: *Committee on Water Laws (ASCE).

The Committee on Water Laws of the Irrigation and Drainage Division of the American Society of Civil Engineers has suggested that states declare a water use policy. The Committee has developed a general statement for a recommended policy for adoption by the states. This policy declares that all water in its natural environment is part of the public wealth and that it is a natural resource subject to appropriation. Implicit in this statement is the declaration that the appropriation doctrine, as applied in the western United States, should be adopted by all states. This doctrine recognizes three distinct elements--diversion, reasonable beneficial use, and private property. This publication questions the desirability of accepting western water right appropriation doctrines universally and, to some extent, the desirability of the continued application of this doctrine in the West. For example, under present appropriation laws, the use of water for maintaining low streamflows to protect fish life and provide recreation was found not to be a valid appropriation because an actual diversion was not necessary. Many other problems exist in deciding the best possible beneficial use of desired diversions and in the length of time the appropriations are granted. (Poertner)
W73-12007

JUDICIAL-ORIENTED INSTITUTIONAL SOLUTIONS: SAN GABRIEL VALLEY EXPERIENCE,
Clayson, Stark, Rothrock and Mann, Corona, Calif.
For primary bibliographic entry see Field 04B.
W73-12009

MISSOURI WATER QUALITY STANDARDS SUMMARY.
Missouri Clean Water Commission, Jefferson City.
For primary bibliographic entry see Field 05G.
W73-12034

FLOOD PLAIN REPORT - CITY OF SOUTHFIELD.
Southfield City Administrator's Office, Mich.
For primary bibliographic entry see Field 04A.
W73-12045

NATIONAL LAND USE POLICY: OBJECTIVES, COMPONENTS, IMPLEMENTATION.

Proceedings of a special conference sponsored by the Soil Conservation Society of America, November 27-29, 1972, Des Moines, Iowa. Soil Conservation Society of America, Ankeny, Iowa, 1973. 220 p, 4 fig, 9 tab, 56 ref. Price: $3.50.

Descriptors: *Land use, *Water resources, Urban land use, Planning, Environmental effects, Natural resources, Institutions.
Identifiers: Land use policy.

Important current issues and problems concerning a national land use policy are discussed by 18 public officials and experts on land use. The articles fall under four categories: (1) the need for a national land use policy and the objectives involved; (2) the components of a land use policy, including natural resources, human considera-

tions, water resources, economics, and transportation; (3) the implementation of land use policies and plans; and (4) some thoughts about the future, including the emerging role of the States. With respect to water-related aspects of land use policy emphasis is placed on the growing interface between water resource planning and land use. For example, although water resource development has dealt effectively with floods and drought more emphasis is required on problems related to land use such as water quality, fish and wildlife habitat, sedimentation and erosion, recreation, and ecological balance. This is particularly true in urban areas where land uses are subject to quick and extensive changes. (Elfers-North Carolina)
W73-12048

(A BILL TO BE ENTITLED: THE OIL POLLUTION COMPENSATION ACT OF 1973).

Senate Bill no 841, 93d cong, 1st Sess (February 8, 1973). 35 p.

Descriptors: *United States, *Liability, *Legislation, *Oil pollution, International law, Ships, Legal aspects, Water quality standards, Oil spills, Oil wastes, International waters, Oil, Water pollution sources, Damages, International commissions.
Identifiers: *Absolute liability.

The Oil Pollution Compensation Act of 1973 would implement the International Convention on Civil Liability for Oil Pollution Damage and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage. The bill provides that the owner of a ship at the time of the incident, or where the incident consists of a series of occurrences, at the time of the first such occurrence, shall be liable for any pollution damage caused as a result of the incident. Moreover, it provides that it applies exclusively to pollution damage (other than preventive measures) caused on the territory, including the territorial sea, of the United States or of any foreign country which is party to the Liability Convention, and to preventive measures, wherever taken, to prevent or minimize such damage. The owner shall not be liable for pollution damages if he proves that the damage resulted from an act of war, hostilities, civil war or insurrection, was wholly caused by an act or omission done with intent to cause damage by a third party or was wholly caused by the negligence or wrongful act of any government or other authority responsible for the maintenance of various navigational aids. (Mockler-Florida)
W73-12191

THE TECHNOLOGY OF SOLID WASTE MANAGEMENT--IMPLICATIONS FOR STATE POLICY.
California Assembly General Research Committee, Sacramento. Assembly Science and Technology Advisory Council.
For primary bibliographic entry see Field 05G.
W73-12193

REGULATION RELATING TO MONITORING AND REPORTING WASTEWATER DISCHARGES AND THEIR EFFECT UPON RECEIVING WATERS.
North Carolina Dept. of Natural and Economic Resources, Raleigh.
For primary bibliographic entry see Field 05G.
W73-12194

OZARK INDUSTRIES, INC. V. STUBBS TRANSPORTS, INC. (ACTION TO RECOVER FISH-KILL DAMAGES WHEN GASOLINE FROM OVERTURNED TRUCK FOUND ITS WAY INTO SPRINGFED TROUT POOL).

351 F. Supp. 351-364 (W.D. Ark. 1972).

Descriptors: *Arkansas, *Judicial decisions, *Negligence, *Groundwater movement, Trout, Legal aspects, Gasoline, Fuels, Water quality, Underground streams, Damages, Water pollution sources, Accidents, Fish farming.
Identifiers: *Strict liability.

Plaintiff trout farm operator sued to recover from the defendants gasoline truck driver and his employer for the loss of approximately 70,000 fish, allegedly killed when gasoline spilled from the truck following a traffic accident, percolated into a groundwater stream and flowed almost three miles into plaintiff's trout pool. The court initially determined that under Arkansas law, theory of strict liability was inapplicable to a right of recovery for death of fish from alleged contamination of trout pools when the gasoline and fuel oil were carried for such a long distance by subterranean waters and into the springfed trout pools. The court added that it was not a foreseeable consequence of the accident that the gasoline would percolate into subterranean waters and be carried into plaintiff's pond. As a result, the Federal District Court held that even if the driver was negligent, neither the driver nor his employer were liable for the death of plaintiff's fish. (Mockler-Florida)
W73-12197

REPORT ON PUBLIC HEARINGS ON THE ADOPTION OF PROPOSED REGULATIONS FOR THE PURPOSE OF IMPLEMENTING THE WATER AND AIR QUALITY REPORTING ACT OF 1971.
North Carolina Dept. of Natural and Economic Resources, Raleigh.
For primary bibliographic entry see Field 05G.
W73-12198

A BILL TO ASSURE THE PUBLIC IS PROVIDED WITH AN ADEQUATE QUANTITY OF SAFE DRINKING WATER.

Senate Bill 433, 93rd Cong, 1st Sess, (1973). 33 p.

Descriptors: *United States, *Potable water, *Legislation, *Water quality standards, *Public health, Water policy, Water sources, Standards, Water pollution sources, Law enforcement, Water purification, Water treatment, Federal government, Domestic water, Water quality, Water supply.
Identifiers: *Safe Drinking Water Act of 1973.

S.433, the Safe Drinking Water Act of 1973, would assure that the public is provided with an adequate quantity of safe drinking water by issuing proposed regulations prescribing national primary and secondary drinking water standards. These standards are to be such that the attainment and maintenance of them are requisite to reasonably protect the public health. The addition of any substance other than for the purpose of treating contaminants is proscribed by the bill. These standards shall prescribe the maximum permissible levels for any contaminants which may exist in any public water system in the U.S. which may cause or transmit disease, chemical poisoning, or other impairments to man. Moreover, they may apply to any feature of the water supply system, including the treatment, storage, and distribution facilities. In addition, the standards shall include requirements for the adequate operation, maintenance, surveillance, and monitoring of water quality adequate to assure a dependable supply of drinking water. Also included are requirements for construction and site selection of public water system facilities so as to protect them from floods and other natural disasters. (Mockler-Florida)
W73-12199

FELTON V. HODGES (STATE'S AUTHORITY TO REGULATE COMMERCIAL FISHING BEYOND ITS TERRITORIAL WATERS).

374 F.2d 337-340 (5th Cir. 1967).

Descriptors: *Florida, *State jurisdiction, *Fish management, *Commercial fishing, *International waters, Fishing, Saline water fish, Judicial decisions, Jurisdiction, Governmental interrelations, Fish conservation, Constitutional law, Shellfish, Legislation, Commercial shellfish, Law enforcement.

Appellant's activities in violation of the state commercial salt water fishing laws resulted in his arrest and the confiscation of his equipment. The fishing may have been done outside the seaward boundary of the state's jurisdiction; appellant argued that state jurisdiction was improperly extended. Appellant maintained that any attempt whatsoever by the State of Florida to regulate his fishing outside its territorial boundaries was violative of his constitutional rights. The Fifth Circuit Court of Appeals found that Florida had sought by legislative enactment to extend the jurisdiction of its conservation officials to activities that occurred outside state territorial boundaries. The court held that such extension was constitutional because appellant was a citizen of the state which issued the law. A state with the requisite interest, and Florida had such an interest in crawfish which moved in and out of territorial waters, may subject its citizens to extra-territorial regulation in order to protect that interest. (Smith-Adam)
W73-12200

DISCHARGE OF UNTREATED WASTES INTO THE MISSISSIPPI RIVER.
La. Rev. State. sec. 56:1464.2 thru 56:1464.4 (Supp. 1973).

Descriptors: *Water pollution control, *Waste treatment, *Louisiana, *Legislation, Water pollution (Abatement), Waste disposal, Wastes, Regulation, Penalties (Legal), Disposal, Pollution abatement, Legal aspects, Legal review, Mississippi River, Water management (Applied), Water quality control, Water utilization, Water pollution sources, Water conservation, Water law.
Identifiers: *Civil liability, *Damages (Legal), Injunctions (Prohibitory).

This chapter provides for legal penalties against persons who willfully and intentionally discharge or cause to be discharged any untreated wastes into any body of public water in the state after December 31, 1972, with provisions for extention if reasonable progress is shown. Liability does not apply to the discharge of salt water or wastes produced in the course of operations for the exploration for or production of, oil, gas or other minerals. The provisions do not apply to any unintentional pollution or contamination resulting from or in connection with the production of agricultural products. Whenever, upon the sworn complaint of any person, it is made to appear that a violation has occurred or may be occurring, the District Court will order a hearing. A copy of the order will be served on the violator. If the court finds a violation has occurred or is occurring, it may assess a civil penalty not to exceed $10,000 for each day during which the violation has occurred and all costs of the hearing. If a violation is found to be continuing, the court may issue an injunction. The complainant must file a $100 bond to cover the hearing cost if the court finds no violation. No liability shall be incurred by complainant due to such filing of a complaint. (Napolitano-Florida)
W73-12204

SAFE DRINKING WATER.
For primary bibliographic entry see Field 05G.
W73-12205

PROPOSED FLORIDA FRONTIER RIVERS NATIONAL CULTURAL PARK.

Hearing--Subcomm. on National Parks and Recreation--Comm. on Interior and Insular Af-

fairs, U.S. House of Representatives, 92d Cong, 2d Sess, March 28, 1972. 45 p.

Descriptors: *National parks, *Florida, *Legislation, *Estuaries, Parks, Recreation facilities, National historic parks, Land use, Natural resources, Scenery, Conservation Aesthetics, Eminent domain, Preservation.
Identifiers: *Congressional hearings.

H.R. 586 would authorize the establishment of the Florida Frontier Rivers National Cultural Park. The purpose is to preserve the Nassau River estuary and associated cultural and historic sites and buildings of northeastern Florida so as to encourage public understanding and appreciation of the heritage fashioned by the past and present interaction of man with this environment. The three estuarine rivers of northeastern Florida unify a nationally significant cultural heritage and, in addition, posses important scenic, natural, ecological, scientific, and other values contributing to public enjoyment and scientific study. The proposed legislation also provides for the designation of additional sites of non-federal ownership for incorporation within the proposed park. The park would comprise 85,000 acres of lands and waters with ownership divided between the federal, state, and local governments. Nearly all of the testimony offered favored passage of the bill. (Mockler-Florida)
W73-12206

DESIGNATING ROCK CREEK IN MONTANA AS PART OF THE WILD AND SCENIC RIVERS SYSTEM.

Hearing--Subcomm. on Public Lands--Comm. on Interior and Insular Affairs, U.S. Senate, 92d Cong, 2d Sess, August 29, 1972. 60 p.

Descriptors: *Montana, *Legislation, *River systems, *Wild River Act, Rivers, Fishing, Conservation, Natural resources, Preservation, Legal aspects, National recreation areas, Planning, Water law.
Identifiers: *National Wild and Scenic River System, *Congressional Hearings, *Rock Creek, Mont.

S. 2132 would amend the Wild and Scenic Rivers Act so as to designate Rock Creek in Montana as a component of the national wild and scenic rivers system. The subcommittee heard statements by interested individuals and representatives of concerned organizations. Representatives of various state agencies and a state senator also made their views known to the subcommittee. Rock Creek gained a reputation as an outstanding sport fishing stream. As a result many dwellings have been built along its banks; these dwellings now represent a major pollution threat. Furthermore, this development is ruining the aesthetic quality of the river. For this reason some feel strongly that the river should be preserved in its natural state. On the other hand, a representative of the Missoula, Montana Chamber of Commerce expressed the opinion that further action on the bill be deferred until a current U.S. Forest Service study of the creek is completed. (Reed-Florida)
W73-12207

UNION DRAINAGE DIST. NO. 1 V. SPECIAL DRAINAGE DIST. (ACTION BY DRAINAGE DISTRICT TO IMPOSE LIABILITY ON ADJOINING DRAINAGE DISTRICTS TO BEAR SHARE OF COST OF CLEAN-OUT WORK ON DITCHES IN THE DISTRICT).

295 N.E.2d 91-96 (2d D.C.A. Ill. 1973).

Descriptors: *Illinois, *Drainage programs, *Judicial decisions, *Drainage districts, Legal aspects, Jurisdiction, Drainage systems, Ditches, Water management (Applied), Flow control, Cost sharing.

Plaintiff drainage district sued to have defendants adjoining drainage districts bear a just proportion of the costs of a projected clean-out work on ditches in the plaintiff district. The Illinois Appellate Court held that the adjoining districts had presented sufficient evidence to show that they would receive no benefits from the projected work and that therefore they were incorrectly assessed. This was so despite the fact all three districts involved were located in the same watershed and all of the water from the adjoining districts' ditches emptied into and through the plaintiff district's ditch. The court emphasized that in order to be assessed for a drainage project, the lands must be rendered more productive, more accessible, or the market value substantially increased and their actual or intrinsic value enhanced. The mere fact that the flow of water has or will be accelerated is not of sufficient benefit to justify an assessment for a drainage project. (Mockler-Florida)
W73-12208

CITIZENS FOR CLEAN AIR, INC. V. CORPS OF ENGINEERS, U.S. ARMY (PUBLIC HEARING NOT REQUIRED UNDER THE NEPA).
356 F. Supp. 14-21 (S.D. N.Y. 1973).

Descriptors: *United States, *Legal review, *Administrative decisions, *Judicial decisions, *Environmental effects, Waste water (Pollution), New York, Water pollution, Water quality, Waste water disposal, Legal aspects, Permits, Project planning, Water quality, Adjudication procedure, Hydroelectric plants, Administrative agencies, Legislation, Federal Water Pollution Control Act.
Identifiers: *National Environmental Policy Act, *Environmental Impact Statements.

Plaintiffs private citizens moved for an order enjoining the defendant utility company from proceeding with the construction of a water intake and discharge facility, and to enjoin the defendant Army Corps of Engineers from issuing any permit in connection therewith. Plaintiffs contended that the Corps' refusal to hold a public hearing on the environmental impact statement being prepared as a precondition to issuance of the permit was in violation of the National Environmental Policy Act (NEPA) and of due process at law. The United States District Court for the Southern District of New York held that NEPA does not require the holding of a public hearing, and that even if the Corps' regulations required such a hearing, it is not required to be held before the impact statement is completed. The Court therefore dismissed plaintiff's motion. (Reed-Florida)
W73-12209

EXPLOITATION OF SEABED MINERAL RESOURCES--CHAOS OR LEGAL ORDER,
J. Dombroski.
Cornell Law Review, Vol 58, No 3, p 575-601, March 1973. 149 ref.

Descriptors: *Beds under water, *Mineral industry, *Oceans, *International law, Continental shelf, Legal aspects, Exploitation, Governments, United Nations, Jurisdiction, Mining, Exploration, Beds, Law of the sea, Treaties, International commissions, International waters.

The need for new order in the international seabed becomes increasingly intense as technology continues to march seaward. A new legal order in the seabed must provide for a system which guarantees mutual recognition of and non-interference with various extractive activities and which provides mechanisms for the peaceful settlement of disputes. Present defects in the international framework are pointed out; the exploitability criterion of the Geneva Convention is both indeterminate and outmoded as a limit on national jurisdiction. As an example, the United States has already issued exploration permits for areas of the sea lying 300 miles from the coast and at depths ranging up to 1,525 meters. Existing seabed controls may lead to creeping jurisdiction, not only outward from the coast, but also vertically through the water column. The fear exists that the lack of legal order in the seabed will slowly erode the area of high seas as nations claim greater preferential rights. Further, unregulated national exploitation of the seabed may lead to new levels of international strife and conflict. (Mockler-Florida)
W73-12210

ENVIRONMENTAL LAW--EXPANDING THE DEFINITION OF PUBLIC TRUST USES,
M. Smythe.
North Carolina Law Review, Vol 51, No 2, p 316-325, December 1972. 54 ref.

Descriptors: Easements, *Judicial decisions, *Public rights, *Flood plain zoning, Wetlands, Legal aspects, Constitutional law, Coastal marshes, Land use, California, New Jersey, Wisconsin, Land development, Water rights, Legislation, State governments, Intertidal areas.
Identifiers: *Public trust doctrine, Coastal zone management, Inverse condemnation.

One problem faced by legislatures when attempting to control the use of coastal wetlands is that by attempting too much regulation they may encroach upon property owners' rights protected by the fifth amendment's prohibition against taking property without just compensation. A recent case in California held that an individual's ownership of tidelands is burdened with a public trust easement. Thus, the landowner was prohibited from constructing a marina on his tidelands. This case provides one means of avoiding inverse condemnation problems in regulating wetlands. New Jersey joined California in expanding the public trust doctrine when its Supreme Court decided that the public trust doctrine prohibited municipalities from charging higher rates to non-residents than to residents attempting to use the city's beaches. Plaintiffs had not argued the public trust as a theory of recovery; however, the court supplied the rationale on its own. There is room for abuse if the government carries the public trust doctrine too far; thus, there must be limits to the type of use the government wishes to make of its easement. Fairness dictates that this doctrine should only be used as a stopgap approach to the prevention of wetlands destruction. (Mockler-Florida)
W73-12211

OIL AND GAS--RIGHTS OF MINERAL LESSEE IN USE OF SURFACE OWNER'S FRESH WATER FOR SECONDARY RECOVERY PURPOSES, SUN OIL V. WHITAKER.

Land and Water Law Review, Vol 8, No 1, p 175-183, 1973. 38 ref.

Descriptors: *Leases, *Easements, *Competing uses, *Water rights, *Texas, Judicial decisions, Mineral industry, Legal aspects, Exploitation, Groundwater mining, Groundwater resources, Wells, Irrigation.

A decision is analyzed of the Texas Supreme Court dealing with the rights of a mineral lessee to use the surface owner's fresh water for secondary recovery purposes. This case is apparently the first state decision granting the lessee as the owner of the dominant estate an implied easement to use fresh water resources owned by the surface estate landowner in such manner that the surface estate landowner would be substantially and irreparably injured. The mineral estate is dominant because the lessee's rights to use the surface estate are superior to those retained by the lessor insofar as necessary to the full enjoyment of the mineral grant. A previous case had limited this relationship by saying that the mineral lessee cannot make unreasonable use of the surface estate. In the absence of a showing of adequate consideration paid by the mineral lessee for his substantial taking

of the surface estate, the courts should not attempt to transfer a valuable property interest without clear evidence that this was the intent of the parties. (Mockler-Florida)
W73-12212

CIVIL LIABILITY FOR OIL POLLUTION,
For primary bibliographic entry see Field 05G.
W73-12213

THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972: EFFECTIVE CONTROLS AT LAST,
For primary bibliographic entry see Field 05G.
W73-12214

DRAINAGE LAW IN NORTH DAKOTA: AN OVERVIEW,
North Dakota Univ., Grand Forks. School of Law.
R. E. Beck, and B. E. Bohlman.
North Dakota Law Review, Vol 47, No 4, p 471-513, Summer 1971. 255 ref.

Descriptors: *North Dakota, *Drainage, *Drainage practices, *Surface drainage, *Drainage districts, Legal aspects, Governments, Drainage systems, Farm management, Surface runoff, Water control, Drainage programs, Adjudication procedure, Administrative agencies, Common law, Judicial decisions, Reasonable use, Watershed Protect, and Flood Prev. Act, Legislation, Natural flow doctrine.
Identifiers: Common enemy rule.

This comprehensive analysis of drainage law in North Dakota surveys the substantive common law and institutional law as it now exists in North Dakota in relation to drainage, and attempts to indicate some of the gaps that exist. The institutional law discussion focuses on Drain Board projects and recognizes that other local authorities may also sponsor drainage projects. It does not explore in any depth the role of the State Water Commission in drainage. The judicial decisions rendered on drainage are not entirely reliable since the applicable statutory provisions have been subsequently revised in scope and meaning. Drainage in North Dakota is characterized by a misconception as to the value of drainage installation so far as agricultural lands are concerned because in many instances, the assumed benefits never materialized. The flexible common law and the institutional approach work hand in hand. The institution can frequently act as mediator between differing parties without having to assert its drainage powers. (Mockler-Florida)
W73-12215

WATER POLLUTION CONTROL.

Congressional Record, Vol 119, No 9, p 1016-1018 (daily ed.) January 18, 1973.

Descriptors: *Federal Water Pollution Control Act, *Agriculture, *Pollution abatement, *Legislation, *Water pollution control, Legal aspects, Industrial wastes, Liquid wastes, Waste disposal, Waste water disposal, Water pollution, Water reuse, Waste treatment, Permits, Grants, Treatment facilities, Water quality standards, Water pollution sources.
Identifiers: Environmental Protection Agency.

Introduced into the Congressional Record was an article by the President of American Agribusiness Associates commending federal attempts at pollution control, particularly the 1972 Federal Water Pollution Control Act (FWCA). Modern agriculture was challenged to aid in assuring a quality environment. Agriculture contributes more waste than mineral, industrial or residential sources; the problem is accentuated by the wastes resulting from modern efficient agricultural techniques. The 1972 FWPCA is particularly important in that it gives the Environmental Protection Agency authority to require firms discharging pollutants into waters to meet water quality standards, and to preempt state minimum effluent levels with more effective guidelines established by the EPA. The FWPCA is discussed in relationship to its effect on agricultural industries such as poultry slaughtering plants. (Glickman-Florida)
W73-12216

LOUISIANA COASTAL COMMISSION.

La. Rev. Stat. secs. 34:2251 thru 34:2253.1 (Supp. 1973).

Descriptors: *Louisiana, *Legislation, *Water management (Applied), *Multiple purpose projects, *Coastal plains, Coastal marshes, Saline water intrusion, Coastal engineering, Administrative agencies, Administrative decisions, Regulation, Project planning, Water allocation (Policy), Water policy, Water resources development, Flood control, Navigation, Freshwater, Water pollution control, Water yield improvement, Wildlife conservation, Drainage, Environmental effects.
Identifiers: *Administrative regulations, *Coastal zone management.

The Louisiana Coastal Commission, (Commission), is established as a political subdivision of the state and body corporate. The Commission replaces the abolished Louisiana intracoastal Seaway Commission. The Commission is to be administered by a Board of Commissioners, (Board), with provisions set forth as to membership on the Board and their authority to establish rules necessary to regulate the Commission. The Commission is empowered to plan, establish, construct, own, operate, and maintain: (1) a system of navigation channels to improve navigation conditions for water traffic; (2) structures necessary to preserve and increase fresh water supply; (3) structures to provide fresh water systems and wildlife habitat; (4) structures to prevent salt water intrusion from the Gulf of Mexico; and (5) structures to improve drainage for flood control. In furtherance of these goals, the Commission is authorized to levy taxes to finance projects. The area of the Commission's jurisdiction is limited to specific parishes along the Louisiana coast. (Dunham-Florida)
W73-12217

SAVE OUR TEN ACRES V. KREGER (STANDARD OF JUDICIAL REVIEW OF AGENCY ACTION UNDER NEPA).

472 F.2d 463-468 (5th Cir. 1973).

Descriptors: *United States, *Legal review, *Administrative decisions, *Judicial decisions, *Environmental effects, Flood plains, Ecology, Environmental control, Air pollution, Legal aspects, Flood plain zoning, Construction, Legislation, Administrative agencies.
Identifiers: National Environmental Policy Act, Environmental Impact Statements.

Plaintiff appellant was a voluntary unincorporated association which sought to enjoin the construction of a federal office building. Appellant contended that the General Service Administration (GSA) failed to comply with the National Environmental Policy Act when it failed to file an environmental impact statement regarding the site selection for the office building. Appellant also contended that construction of the building would aggravate a substantial air pollution problem and would be improperly located in a flood plain. Appellee answered that there was no need to file a statement because the construction would not significantly affect the quality of the human environment. The trial court had refused to grant relief, holding that the decision of the GSA to not file an impact statement could not be overturned unless it was found to be arbitrary, capricious or an abuse of discretion. The Fifth Circuit Court, while not going to the merits of the claim, reversed and remanded directing that the more relaxed standard of reasonableness rather than arbitrary or capricious be used by the court in reviewing the decision of the GSA to not file an impact statement. (Glickman-Florida)
W73-12218

CONSCIOUSNESS OF STREAMS: THE 1971 ALABAMA WATER POLLUTION CONTROL ACT.

Alabama Law Review, Vol 24, No 3, p 737-776, Summer 1972. 40 p, 251 ref.

Descriptors: *Alabama, *Administrative agencies, *Water pollution sources, *Legislation, *Water pollution control, Industrial wastes, Legal aspects, Water quality control, Tennessee Valley Authority, Sewage effluents, Waste disposal, Federal Water Pollution Control Act, Penalties (Legal), Law enforcement, Adjudication procedure, Mine wastes, Agricultural runoff, Thermal pollution, Water quality standards, Governments.
Identifiers: *Alabama Water Pollution Control Act, Administrative regulations.

The 1971 Alabama Water Pollution Control Act created a Water Improvement Commission. Unlike a previous commission, members of the new Commission may not be connected with industry. Those 'persons' subject to restrictions of the Act include individuals, public corporations, any form of business and municipal corporations; it does not include the federal government, the state, counties and probably the Tennessee Valley Authority. All waters of the state, whether non-navigable or navigable, underground or surface, are covered by the Act. A definition of pollution is included in the Act, however, the Commission may by regulation amplify or restrict the definition. Provision for penalties are also discussed. The major sources of water pollution in Alabama are: strip mining, animal manure, thermal pollution, radiation, vessels, sewage and industrial wastes. The effectiveness of the Act depends upon the promulgation of adequate regulations by the Commission for such things as effluent limitations and water quality standards. The legislature has attempted to create an unbiased commission and has given it adequate legal powers and discretionary authority to fill the interstices of the statute. (Mockler-Florida)
W73-12219

DAMS AND SPILLWAYS (HEARINGS AND APPEAL).

Iowa Code Ann. secs. 112.3 thru 112.8 (Supp. 1973).

Descriptors: *Iowa, *Dams, *Legislation, *Administrative agencies, *Legal review, Water policy, Legal aspects, Spillways, Compensation, Compensatory payment, Cost repayment, Dam construction, Structures, Administrative decisions, Water management (Applied), Project planning, State governments.
Identifiers: *Administrative hearings.

After the Commission approves a dam or spillway project it shall set a hearing date and publish notice of the hearing in a newspaper of general circulation for a specified time period. Any claim for damages resulting from the project shall be filed with the Commission at or before the hearing. The Commission shall examine each claim and determine the amount of damages and compensation due each claimant. After such action, the Commission may proceed with the project or dismiss the entire proceedings. Any appeals from decisions of the Commission shall be treated as ordinary proceedings. All other appeals shall be triable in equity. Appeals must be taken within 20 days of

final action or order of the Commission by filing notice with the secretary of the Commission. This notice must be accompanied by an appeal bond conditioned to pay all costs adjudged against the appellant. (Glickman-Florida)
W73-12220

WATERCOURSES--CANALS--TOLL BRIDGES,

Ind. Ann. Stat. secs. 26-1413 thru 26-1417 (1970).

Descriptors: *Indiana, *Legislation, *Canals, *Channel improvement, Navigation, Flow, Conveyance structures, Transportation, Local governments, Canal construction, Repairing, Streams, Bridges, Channels, Administration, Economics, Planning, Financing, Open channels, Legal review.
Identifiers: *Canal repair, *Toll bridges, Navigation obstructions.

It is unlawful for the Board of Commissioners, (Commissioners), of any county in Indiana in, through, along, or by which passes any canal, which is now used for the purpose of navigation, to appropriate out of the county treasury any amount of money not exceeding $10,000, to aid in putting or keeping in repair any such canal for the purposes of navigation. The Commissioners may purchase any toll bridge or buy any private interest therein. A provision is also made in the statute for the straightening or clearing of channels of non-navigable streams by the couty commissioners upon a petition of 51% of landowners whose frontage lies between any two public bridges or other points designated in the petition. (Reed-Florida)
W73-12221

DRAINAGE MAINTENANCE AND REPAIR DISTRICTS.

Ind Ann Stat secs 27-243 thru 27-250 (1970).

Descriptors: *Indiana, *Legislation, *Drainage districts, *Drainage programs, Water management (Applied), Land management, Flood control, Financing, Repairing, Maintenance, Drainage, Drainage systems, Drains, Ditches, Legal aspects, Project planning, Regulation, Legal review, Administrative agencies, Administrative decisions.

In all cases where a public ditch or drain has already been or shall hereafter be constructed, a specified percentage of the owners of the real estate assessed who would benefit by the construction of such ditch or drain may file a petition in the appropriate court praying for the establishment of a Drainage Maintenance and Repair District, (District). The requirements that must be met and the procedures to be followed for the establishment of the District are specified. If the court approves the petition, it will establish a commission composed of landowners within the district to administer the District. The commission is to keep and maintain such ditches and drains in proper condition and has full power and authority to hire all such labor, purchase all such material and do all such acts as are necessary and incident thereto. Provision is made for the dissolution of the District upon the petition of a specified percentage of the landowners within the District. Affected landowners may request a hearing on establishment of a district or on projects approved by the commissioners. (Reed-Florida)
W73-12222

DRAINS AND WATERCOURSES AFFECTING HIGHWAYS.
Ind Ann Stat secs 27-407, 24-408 (1970).

Descriptors: *Indiana, *Legislation, *Flow control, *Water control, *Road construction, Channel improvement, Highways, Embankments, Highway effects, Flow, Drains, Ditches, Streams, Bridges, Drainage systems, Administration, Planning, Governmental interrelations, Project planning, Rights-of-way, Erosion control, Slope stability.

The governing bodies or agencies of the state of Indiana charged with the duties of the construction, maintenance and repair of public highways shall have the power to change the course of any stream, watercourse or drainage ditch, or to restore to its original or former channel any stream, watercourse or drainage ditch in case it has wandered from its original or former course. Such bodies or agencies may also do such construction work as may be necessary to protect the banks or slopes of any such stream, watercourse or ditch in the event that the waters of any such stream, watercourse or ditch are causing or threatening injury to any public highway or bridge. If the proposed work of any such state agency conflicts with the jurisdiction of a federal agency, the consent or waiver of such federal agency shall be procured before the beginning of the proposed work. The means of accomplishing the purposes of this act by the proper agency, the procedure therefor, and the method of paying the costs thereof are provided for in the statute. (Reed-Florida)
W73-12223

PROTECTION OF LAKES.
Ind Ann Stat secs 27-601 thru 27-659 (1970).

Descriptors: *Indiana, *Legislation, *Water levels, Lakes, Drainage programs, Drainage systems, Freshwater, Administrative agencies, Dams, Levees, Drainage, Drainage area, Ditches, Drainage districts, Drains, Legal aspects, Administration, Planning, Permits, Water law, Economics, Project planning, Assessments, Legal review.
Identifiers: *Freshwater lakes.

It is unlawful to establish, order or construct any ditch or drain cutting into, through or upon the line of any freshwater lake or to in any way construct a ditch or drain having a bottom depth lower than the level of the lake as established by law. This act applies to all drainage projects that are to be constructed, whether they are in the nature of alterations, changes or other improvements, as well as to the construction of new ditches and drains. It is unlawful to interfere with any dam, bank or levee or to lower the water level, with certain exceptions, of any artificial lake. It is unlawful to construct or repair any ditch or drain having a specified bottom depth without first having received the permission of the Indiana Department of Conservation, (Department). The Department is authorized to establish the average water levels for all lakes and to construct, sponsor and supervise all works necessary to maintain that level. The act makes provision for the procedures necessary for the Department to fulfill these functions including legal review of project plans and liability for violations of the act. (Reed-Florida)
W73-12224

LEVEES.

Ind Ann Stat secs 27-806 thru 27-818 (1970).

Descriptors: *Indiana, *Legislation, *Levees, *Flood control, Regulation, Encroachment, Levee districts, Safety, Streams, Water control, Barriers, Flood protection, Condemnation, Legal aspects, Administration, Land use, Water management (Applied), Administrative agencies, Financing, Project planning, Legal review, Water distribution (Applied).
Identifiers: Fences.

The committee placed in the charge and control of a levee has full power and authority to make all necessary repairs in order to keep and maintain the levee in its orginal condition. The committee has the power to change the line and location of a levee at any point, if it is necessary to the safety and protection of such levee. The committee has full power over a levee for the purpose of preserving and protecting such levee. The committee, when requested in writing by a majority of the owners of land protected by the levee under its charge, has the authority to protect against the encroachment of any stream, to make additions to such levee by increasing its height or width and to remove from lands protected by such levee any water that may collect or remain standing and which has no means of outlet. Provisions are included for the acquisition of real estate by condemnation. The statute also provides for the collection of assessments for the completion of proposed projects. (Reed-Florida)
W73-12225

LEVEE AUTHORITY DISTRICTS.

Ind Ann Stat secs 27-1001 thru 27-1033 (1970).

Descriptors: *Indiana, *Legislation, *Levees, *Levee districts, *Flood control, Safety, Water control, Land use, Financing, Barriers, Flood protection, Administration, Eminent domain, Right-of-way, Easements, Legal aspects, Planning, Regulation, Governmental interrelations, Legal review, Administrative agencies.

Whenever the council of a city located in a county within a specified population range adopts legislation in favor of the establishment of a Levee Authority District, (District), under the provisions of this act, for the purposes of acquiring land, rights-of-way and easements on which the Board of the District or the United States Army Corps of Engineers can construct, improve, maintain, equip, control, lease and regulate levees to hold back flood waters, such District, conterminous with the jurisdictional boundaries of the councils enacting such legislation, will be established. The composition of the board as well as its powers and duties are specified. The Board of any District is authorized to exercise the power of eminent domain and issue general obligation bonds to meet the financial needs of the Board. Specific provisions dealing with administration, regulation and financing District projects are included. (Reed-Florida)
W73-12226

GROUNDWATER CONSERVATION.
Ind Ann Stat secs 27-1301 thru 27-1316 (1970).

Descriptors: *Water supply development, *Indiana, *Legislation, *Groundwater resources, *Well regulations, Groundwater, Water pollution, Water management (Applied), Water policy, Water quality control, Groundwater availability, Groundwater mining, Water sources, Water supply, Water wells, Wells, Water conservation, Water resources, Legal aspects, Administration, Regulation, Planning, Permits, Penalties (Legal).
Identifiers: *Administrative regulations.

It is declared to be the public policy of the state of Indiana to conserve and protect its groundwater resources. The Indiana Department of Conservation, (Department), may designate certain areas where the withdrawal of groundwaters exceeds or threatens to exceed its natural replenishment as restricted use areas. In such areas, it is unlawful, except under certain circumstances, for any person or group except public utilities to withdraw or use for any purpose groundwater in excess of a specified amount per day. All well owners in restricted areas must file with the Department a complete record of all new wells drilled in the area. The Department has the authority to require waste control measures and to require owners of flowing waterwells to reduce the flow of such wells. A per-

mit must be obtained from the Department to introduce potable groundwater into any underground formations which contains nonpotable water. The Department is authorized to adopt such rules and regulations as may be necessary to determine quantities of water being removed from the ground or for administering any provisions of this act. Penalties for any violations of this act are provided. (Reed-Florida)
W73-12227

ENVIRONMENTAL POLICY.

Ind Ann Stat secs 35-3501 thru 35-5308 (Supp. 1972).

Descriptors: *Environmental control, *Water resources development, *Indiana, *Legislation, *Environmental effects, Decision-making, Planning, Public health, Water pollution control, Administrative agencies, Regulation, Comprehensive planning, Ecology, Pollution abatement, Natural resources, Standards, Social aspects, Water resources development.
Identifiers: *State policy.

The purposes are to declare a state policy which will encourage productive and enjoyable harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man, and to enrich the understanding of the ecological systems and natural resources important to the state of Indiana. The statutes provide that all agencies of the state shall utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and decision-making which may have an impact on man's environment, identify and develop methods and procedures which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making, and include in every recommendation or report on proposals for legislation and other major state actions significantly affecting the quality of the human environment a detailed statement on the environmental impact of the proposed action. All state agencies are to review present statutory authority, regulations, policies and procedures and propose changes to comply with the provisions of this chapter. (Mockler-Florida)
W73-12228

INDIVIDUAL DRAINAGE RIGHTS.

Iowa Code Ann secs 465.1 thru 465.35 (1971).

Descriptors: *Iowa, *Legal review, *Drainage systems, *Legislation, Drainage, Drainage practices, Drainage programs, controlled drainage, Drainage effects, Tile drainage, Drainage area, Water policy, Surface waters, Mine drainage, Right of way, Easement, Legal aspects, Agriculture, Flood control, Local governments, Administrative decisions, Public benefit, Damages, Outlets.
Identifiers: *Drainage rights.

When any landowner desires to construct any drainage system for agricultural or mining purposes or for securing more complete drainage across the land of another, the right of way of a railroad or a highway, he must file an application with the County Auditor. The auditor will then set a hearing date before the County Board of Supervisors (Board) and serve notice on the party whose land is to be used. Any landowner claiming damages must file his complaint with the auditor prior to the hearing. The Board shall hear the application on the merits to determine if the project is beneficial. Before constructing the drain, the applicant shall pay any damages awarded to the party through whose land the drain will be constructed. Any person who shall obstruct or damage any drain shall be liable to the owner. The Board shall also decide any disputes between adjoining landowners whose property is divided by any watercourses or natural drainage line. Specific provisions relating to hearing procedures and appeals are included. There are also provisions concerning special procedures to be followed when drainage construction affects railroad and public highway rights-of-way. (Glickman-Florida)
W73-12229

POLLUTION OF WATERS OF STATE.

Ind Admin Rules and Reg Ann secs (68-523)-1 thru (68-523)-10 (Supp. 1970).

Descriptors: *Indiana, *Water pollution control, *Water quality, *Water quality standards, Public health, Industrial wastes, Water quality control, Lake Michigan, Bacteria, Waste disposal, Turbidity, Oil, Solid wastes.
Identifiers: *Administrative regulations, Little Calumet River.

These administrative rules and regulations provide for water quality standards and criteria for Lake Michigan open water and shore water, Lake Michigan inner harbor basin, Indiana harbor canal, the Grand Calumet River, Wolf Lake, and the Little Calumet River flowing into Illinois. All waters of the state must be free from substances attributable to municipal, industrial, agricultural or other discharges that will settle to form putrescent or otherwise objectionable deposits and free from floating debris, oil, scum and other floating materials attributable to municipal, industrial, agricultural or other discharges in amounts sufficient to be unsightly or deleterious. Furthermore, all waters must be free of substances in such degree as not to create a nuisance and free from substances or other discharges in concentrations or combinations which are toxic and harmful to human, animal, plant or aquatic life. Criteria for oils, solid wastes, bacteria, BOD count and other elements are provided for each body of water. (Mockler-Florida)
W73-12230

CONSENSUS: THE FIRST STEP,
Northeastern Illinois Planning Commission, Chicago.
For primary bibliographic entry see Field 06F.
W73-12234

ANNUAL REPORT 1972.
Delaware River Basin Commission, Trenton, N.J.

1972. 29 p, 2 fig, 35 photo, 2 tab.

Descriptors: *Water resources planning, *Water quality control, *Regional development, *River basin development, *Delaware River Basin Commission, Environamental effects, Recreation, Planning, Maryland, New Jersey, New York, Delaware, River basins, *Delaware River.
Identifiers: Tocks Island, Hurricane Agnes, Schuylkill River.

The 10th Annual Report includes a summary of the first decade, reports on various on-going programs, an article on the floods that struck the river basin, particularly Hurricane Agnes, and an outline of a new unit of the Commission. The new unit is to deal exclusively with matters of environmental quality and be responsible for complying with the national Environmental Policy Act. Reports on existing programs include the water quality program to clean up the Delaware River estuary, the Tocks Island reservoir and park project and planning for the Schuylkill River sub-basin. Some of the significant areas of involvement of the Commission in the past decade include emergency authority and programs during the severe drought of the mod-1960's, cooperative policies for uniform water quality standards in the basin, the cleanup of the estuary, controls over groundwater, flood hazard mapping and information, power plant siting, and recreation. These program areas and others are carried on largely at a regional scale and are closely related to the strong urban nature and demands in the basin. (Elfers-North Carolina)
W73-12240

US-USSR EXPERTISE EXCHANGE,
W. S. Butcher.
Water Spectrum, Vol. 5, No. 1, p. 17-24, 1973.

Descriptors: *United States, *Water resources development, *Comprehensive planning, *Irrigation projects, Irrigation canals, Drainage, River systems, River training, Salinity, Water pollution, Dams.
Identifiers: Golodnaya Steppe, Kara Kum, Caspian Sea, *USSR.

Water resources has been identified as one of the needed activities between the U.S. and the U.S.S.R. While their irrigated land is less in acreage that in the U.S., the Soviets are working to increase acreage of new irrigated land. Particular reference is made to the Soviets' arid lands projects, especially those in the Golodnaya Steppe where attention is increasingly paid to problems of drainage, irrigation hardware, and automated irrigation practices; and in the Kara Kum Desert where the great water diversion canal is now 500 miles in length and will be double that when it reaches the Caspian Sea in approximately 1980. There is brief mention of the several river reversal projects, some of which are designed to restore the level of the Caspian Sea to overcome problems of increasing salinity and industrial pollution, as well as a decreasing fish harvest. The Soviet stage of water resources development is likened to U.S. recent past, except that their projects are on a larger scale. Little environmental concern is evident to date in the U.S.S.R. (Paylore-Arizona)
W73-12255

THE CHANGING DECISION RULES IN THE POLITICS OF WATER DEVELOPMENT,
Arizona Univ., Tucson.
H. Ingram.
Water Resources Bulletin, Vol 8, No 6, p 1177-1188, December 1972. 1 tab, 12 ref.

Descriptors: *Water resources development, *Political aspects, *Water policy, *Decision making, Federal government, Social impact, Environmental effects, Water resources, State governments, Evaluation, Multiple purpose projects, Economic impact, Project benefits, Projects, Financing, Budgeting, Cost-benefit ratio, Economic feasibility, Ecology.

Policy makers concerned with selecting potential water projects to be authorized and funded for construction have customarily applied a common set of decision rules to minimize the cost of decision making. These rules are identified, their operation described, and the logic behind adoption explained. The 5 decision rules are: local support, agreement, mutual accommodation, mutual noninterference, and fairness and equity. These guidelines are intended to ensure support, lessen conflict, and protect the reputation of water development as a worthwhile Federal investment. Currently, conflict has greatly increased the cost of the decision-making process to the Federal agencies which must spend the time, energy, effort, and influence to resolve differences among interest groups. Since current indications are that the traditional rules are no longer followed, an attempt has been made to identify changes in the rules. The question remains whether current revisions of decision rules will lessen the intensity of conflict. Today, Federal agencies are spending more energy to increase public participation in the

decision-making process. However, even with all the impacts displayed and points of view heard, Federal agencies doubt that a water development program of past magnitude can be recreated. (USBR)
W73-12335

6F. Nonstructural Alternatives

FLOOD AND EROSION CONTROL.
For primary bibliographic entry see Field 06E.
W73-11978

LEGAL PROBLEMS IN REGULATING FLOOD HAZARD AREAS,
National Water Commission, Arlington, Va.
E. Liebman.
Preprint No. 1869, American Society of Civil Engineers, National Water Resources Engineering Meeting, Washington, D.C., January 29-February 2, 1973. 26 p, 25 ref. Price: $0.50.

Descriptors: *Flood protection, *Non-structural alternatives, *Legal aspects, *Flood plains, Flood plain zoning, Flood insurance, Levees, Floods, Floodproofing, Channel improvement, Regulation.

Flood hazard areas along rivers require both structural and nonstructural protection. Structural devices, such as dams, levees, flood proofing, and channelization are often not adequate by themselves. Nonstructural methods include items such as flood plain zoning, flood insurance and tax adjustments. The lawyer and the engineer have important complementary roles in the management of flood plains. It must be recognized that flooding is a part of the natural process, and that flood problems exist only when this flooding affects man's activities. Structural measures are no panacea for providing flood protection, since structures can be overtopped by flows larger than design flows or they can fail completely. In other cases, there might not exist an available site for protective structures, or funds may be available. Nonstructural methods of control, such as flood plain zoning, tend to balance the benefits obtained against the costs that flooding would impose on the community and the costs incurred by developers prohibited from utilizing land according to their wishes. Nonstructural measures for flood control have been enacted at all levels of government. Some measures are controversial. For example, flood plain zoning requirements may be challenged in the courts for allegedly imposing undue hardships upon riverine landowners. Courts have generally invalidated restrictions which deny all economic uses for flood prone land although severe restrictions are upheld. (Poertner)
W73-12004

SURVEYS REQUIRED TO DESIGN NONSTRUCTURAL MEASURES,
Georgia Inst. of Tech., Atlanta.
L. D. James.
Preprint No. 1881, American Society of Civil Engineers, National Water Resources Engineering Meeting, Washington, D.C., January 29-February 2, 1973. 25 p. Price: $0.50.

Descriptors: *Flood protection, *Non-structured alternatives, *Attitudes, *Data collections, Social aspects, Pyschological aspects, Decision making, Motivation, Flood damage, Flood plains, Flood plain zoning, Flood control, Project planning.

Nonstructural measures for flood protection require information gathering surveys just as structural designs require surveys to gather information. The problems of nonstructural measures are more complex than the problems of structural measures since they depend on human attitudes and actions which vary from person to person and change in time. For example, while a dam may stand for 100 years or more, attitudes on flood plain zoning regulations may change soon after the last major flood is forgotten. This requires vigilance on the part of responsible officials to keep attitudes in theirproper perspective by means of continual information programs. Among individuals, attitudes toward flooding of their property may range from an intense desire to avoid flood prone areas to almost total unconcern for the problems. Surveys of the attitudes of the public to flooding can be used to form a model of how different groups will react to various alternatives to nonstructural measures of flood control. Some people, for instance, live in flood prone areas because they did not realize the flood hazard. Others felt the flood damage expected was outweighed by the advantages of the homesite. Some could be convinced to move out based on the flood hazard to themselves, while others consider the potential disruption of the area's ecology by their presence as a reason for not occuppying flood prone lands. (Poertner)
W73-12005

BALANCING ENVIRONMENTAL AND DEVELOPMENTAL VALUES,
National Water Commission, Arlington, Va.
G. C. Taylor.
Preprint No. 1910, American Society of Civil Engineers, National Water Resources Engineering Meeting, Washington, D.C., January 29-February 2, 1973. 9 p, 2 ref. Price: $0.50.

Descriptors: *Water allocation (Policy), *Water supply development, *Water resources development, *Water values, Alternate water use, Comprehensive planning, Planning, Natural resources, Competing uses, Non-consumptive use, Aesthetics, Social aspects.

The almost total development of usable water supplies is forcing a change in social and political responses to water management problems. It will be necessary to assign values and prices to water use. Concerns for ecosomic development will need to be balanced against the desire for environmental preservation and control. In most sectors of our economy, the economic value of a commodity has been the governing factor for controlling its use. Such a basis for use of water resources can be inadequate since there are social and environmental factors not reflected in the market value. Water allocations are often made by nonmarket means, and are influenced by power monoplies, lack of knowledge, etc. In some types of water use--such as navigation and recreation--the use of the water is nonconsumptive and the water can be used for other purposes. In other uses, the water is consumed and permanently withdrawn from the water supply under examination. In still other uses the water is returned to the water supply in a polluted form, contaminating a large volume of water than actually used. Each of these types of water use has a different value, although the value may be difficult to assign. Often an overall evaluation of all potential water uses will need to be made to optimize water resource management. (Poertner)
W73-12008

JUDICIAL-ORIENTED INSTITUTIONAL SOLUTIONS: SAN GABRIEL VALLEY EXPERIENCE,
Clayson, Stark, Rothrock and Mann, Corona, Calif.
For primary bibliographic entry see Field 04B.
W73-12009

FLASH FLOOD FORECASTING AND WARNING PROGRAM IN THE WESTERN REGION,
National Weather Service, Salt Lake City, Utah. Western Region.
For primary bibliographic entry see Field 02E.
W73-12020

ENVIRONMENTAL LAW--EXPANDING THE DEFINITION OF PUBLIC TRUST USES,
For primary bibliographic entry see Field 06E.
W73-12211

CONSENSUS: THE FIRST STEP,
Northeastern Illinois Planning Commission, Chicago.
M. L. Rockwell.
Water Spectrum, Vol 5, No 1, p 9-16, 1973. 9 photo.

Descriptors: *Flood control, *Coordination, Urbanization, Storm water, Planning, Flood plains, Conferences, Illinois.
Identifiers: *Flood plain management, Chicago, Northeastern Illinois Planning Commission (NIPC), Public involvement.

Flood plain management in heavily urbanized northeastern Illinois where severe flooding has recently occurred is discussed. The Northeastern Illinois Planning Commission has been quite active in advocating flood plain management and carrying out various programs such as flood hazard mapping. However, the results have been limited as urbanization of flood plain areas has proceeded rapidly. With the recent flooding, public concern for flood control and flood plain management has increased considerably and several meetings have been held. The most significant meeting was a Storm Water Conference on March 10, 1973, attended by 550 citizens and elected officials. One result of the Conference was the ranking of various alternative solutions of flood control such as reservoirs, storm sewer systems, land use controls, and channel improvements. The highest ranked alternative was the on-site detention of storm water, particularly in large developments. (Elfers-North Carolina)
W73-12234

6G. Ecologic Impact of Water Development

DEPARTMENT OF ENVIRONMENTAL QUALITY; EXECUTIVE COMMITTEE.
For primary bibliographic entry see Field 06E.
W73-11964

MARINE SANCTUARIES IN CALIFORNIA.
For primary bibliographic entry see Field 06E.
W73-11973

SOIL CONSERVATION AND FLOOD CONTROL DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-11979

INTERSTATE DRAINAGE DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-11981

GREAT LAKES RIVER BASINS COMMISSION.
For primary bibliographic entry see Field 06E.
W73-11984

FLOOD CONTROL.
For primary bibliographic entry see Field 06E.
W73-11987

UPPER MISSISSIPPI RIVERWAY COMPACT.
For primary bibliographic entry see Field 06E.
W73-11989

PROTECTION FROM FLOODS.
For primary bibliographic entry see Field 06E.
W73-11990

WATER QUALITY COMMISSION.
For primary bibliographic entry see Field 06E.
W73-11991

DEEP DRAFT HARBOR AND TERMINAL AUTHORITY.
For primary bibliographic entry see Field 06E.
W73-11994

KEHOE LAKE, TYGARTS CREEK, KENTUCKY (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Huntington, W. Va.
For primary bibliographic entry see Field 06E.
W73-11999

WATER AND AIR POLLUTION CONTROL ACT.
For primary bibliographic entry see Field 06E.
W73-12003

THE EFFECTS OF PLUGGING A DEEP ARTESIAN WELL ON THE CONCENTRATION OF CHLORIDE IN WATER IN THE WATER-TABLE AQUIFER AT HIGHLAND ESTATES, LEE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 02F.
W73-12039

FLOOD PLAIN REPORT - CITY OF SOUTHFIELD.
Southfield City Administrator's Office, Mich.
For primary bibliographic entry see Field 04A.
W73-12045

NATIONAL LAND USE POLICY: OBJECTIVES, COMPONENTS, IMPLEMENTATION.
For primary bibliographic entry see Field 06E.
W73-12048

IMPACT OF NATURAL FACTORS ON WATER USE (VLIYANIYE PRIRODNYKH FAKTOROV NA VODOPOTREBLENIYE),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
N. I. Koronkevich.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 5, p 54-63, September-October 1972. 4 fig, 2 tab, 23 ref.

Descriptors: *Environment, *Environmental effects, *Water utilization, *Use rates, *Water users, Water consumption (Except consumptive use), Consumptive use, Water supply, Water requirements, Water types, Thermal powerplants, Industries, Agriculture, Water temperature, Evaporation, United States.

The amount of water being used by various sectors of the Soviet economy is increasing each year. Although environmental factors affect virtually all items in the water balance, they tend to be ignored in establishing water-use rates and in estimating water consumption. An analysis is made of the impact of environmental factors on the volume of water used by major consumers, including thermal powerplants, industry, domestic and municipal water users, and agriculture. In most sectors of the economy there is a clearly defined relationship between water consumption and the natural environment. Gross water use in the steppe zone of the USSR is generally 20%-30% higher than in the taiga, with an even greater difference in consumptive use. Environmental conditions in the United States account for use rates in industry and thermal-power generation that are 25%-30% higher than in the Soviet Union, while domestic and municipal water requirements in the United States are 20% higher. The differences in consumptive use are even greater. (Josefson-USGS)
W73-12062

RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA, ARKANSAS, AND TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 04A.
W73-12196

HORSE RANGE SWAMP WATERSHED PROJECT, ORANGEBURG COUNTY, SOUTH CAROLINA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Columbia, S.C.
For primary bibliographic entry see Field 04D.
W73-12201

LITTLE RIVER INLET NORTH CAROLINA AND SOUTH CAROLINA--NAVIGATION (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Charleston, S.C.
For primary bibliographic entry see Field 04A.
W73-12202

AQUATIC PLANT CONTROL AND ERADICATION PROGRAM, STATE OF TEXAS (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 04A.
W73-12203

ENVIRONMENTAL POLICY.
For primary bibliographic entry see Field 06E.
W73-12228

NATURAL FEATURES IN BURLINGTON COUNTY.
Burlington County Planning Board, Mount Holly, N.J.

February, 1973. 50 p, 4 tab, 24 maps, 3 append. HUD N.J. P-132.

Descriptors: *Natural resources, Physiography, Climate, Geology, Groundwater, Soils, Urban land use, Agriculture, Erosion control, Aquifers, *New Jersey.
Identifiers: *Burlington County (New Jersey), Urban development constraints, Land use suitability.

The rich and varied natural setting of Burlington County that provides a setting for scientific study, recreation and everyday living is examined. Limitations on development due to natural factors are discussed. Inventories and descriptions of natural features of the county are divided into physiography and climate, geology and hydrology, soils, and animal and plant life. With regard to water resources, the emphasis is on groundwater aquifers and soil suitability for septic tanks. Maps indicate specific areas of the county that are not suitable for various activities or types of development. These include not only general categories such as residential development but also specific uses such as streets and parking lots, parks and playgrounds, sanitary landfills, small building foundations, and areas suitable for certain crops. Recommendations include encouragement of passing flood control and erosion control ordinances, establishment of more stations to monitor environmental conditions, preservation of open spaces and tree preservation especially in subdivisions, discouraging premature development of farm lands, and acquiring of lineal parks along streams in the townships to attack drainage problems along major streams. (Elfers-North Carolina)
W73-12241

SOME CONSERVATIONAL PROBLEMS POSED BY HYDROELECTRIC POWER INSTALLATIONS IN ALBERTA,
Department of Lands and Forests, Lethbridge (Alberta).
For primary bibliographic entry see Field 05C.
W73-12268

ENVIRONMENTAL CONTROL SYSTEMS: TREATMENT OF UNCERTAINTY IN MODELS AND DATA,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06A.
W73-12271

THE ENVIRONMENTAL IMPACT OF GROUND WATER USE ON CAPE COD--IMPACT STUDY NO. 3,
For primary bibliographic entry see Field 05B.
W73-12303

ENVIRONMENTAL GUIDE FOR THE U.S. GULF COAST,
National Climatic Center, Ashville, N.C.
W. A. Brower, J. M. Meserve, and R. G. Quayle.
Available from NTIS, Springfield, Va 22151 as AD-758-455 Price $3.00 printed copy; $1.45 microfiche. Report, November 1972. 179 p, 8 fig, 46 tab, 44 ref, 2 append.

Descriptors: *Harbors, *Gulf of Mexico, *United States, *Engineering structures, Environmental effects, Investigations, Feasibility, Ecology, Planning, Hydrologic data, Climatic data, Meteorological data, Evaluation, Texas, Louisiana, Mississippi, Alabama, Florida.
Identifiers: Pre-construction data, Environmental profiles.

Detailed environmental profiles are presented for seven potential Gulf Coast Deep Water Port sites: Corpus Christi, Galveston-Freeport, Sabine Pass, Bayou Lafourceh, Southwest Pass, Mobile-Pascagoula, and Panama City. Information for each area provides: general description of the area, an area map, pressure, extratropical cyclones, tropical cyclones, winds, extreme winds, waves, visibility, temperature (air and sea), precipitation, cloudiness, relative humidity, and land station summaries, as well as marine area summaries. (Woodard-USGS)
W73-12310

07. RESOURCES DATA

7A. Network Design

WATER RESOURCES DATA IN ALABAMA,
Auburn Univ., Alabama. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06A.
W73-12074

REPORT OF ANALYSES OF WATER SAMPLES SUBMITTED TO SCRIPPS NOVEMBER 1971 FOR THE LAKE MICHIGAN INTERCALIBRATION/INTERCOMPARISON PROGRAM (EHP),
Scripps Institution of Oceanography, La Jolla, Calif. Soledad Lab.
For primary bibliographic entry see Field 05A.
W73-12156

THE DESIGN OF OPTIMAL PRECIPITATION MEASURING NETWORKS FOR FLOOD FORECASTING,
Enviro-Engineers Ltd., Cincinnati, Ohio.
For primary bibliographic entry see Field 02B.
W73-12292

INFORMATION TRANSFER VIA REGRESSION IN MARKOVIAN WORLDS,
IBM Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 06A.
W73-12294

FEASIBILITY STUDY OF THE EXPLOITATION OF ELECTROMAGNETIC SURFACE WAVE PROPAGATION FOR MINERAL PROSPECTING AND MAPPING THE WATER TABLE,
Nebraska Univ., Lincoln. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 02F.
W73-12311

DESIGN OF USAF WATER QUALITY MONITORING PROGRAMS,
Air Force Adademy, Colo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05A.
W73-12317

7B. Data Acquisition

THE EFFECTS OF A SUBARCTIC GLACIER ON RADIO-WAVE PROPAGATION IN SUMMER,
University of Electro-Communications, Tokyo (Japan).
For primary bibliographic entry see Field 02C.
W73-11804

PATTERNS OF SURFACE TEMPERATURE IN THE ALPINE/PERIGLACIAL ENVIRONMENT AS DETERMINED BY RADIOMETRIC MEASUREMENTS,
State Univ. Coll., Geneseo, N.Y. Dept. of Geography.
For primary bibliographic entry see Field 02C.
W73-11806

DIGITAL TELEMETRY--FUNCTIONAL DESCRIPTION AND SPECIFICATIONS,
Geological Survey, Washington, D.C. Water Resources Div.
G. F. Smoot, and R. H. Billings.
Geological Survey open-file report, 1969. 27 p, 3 fig.

Descriptors: *Telemetry, *Digital computers, *Hydrologic data, *Remote sensing, Methodology, Remote control, Control systems, Data collections, Data transmission, Costs.
Identifiers: *Digital telemetry.

A digital telemetry system designed for transmission of hydrologic data is described. This system provides for data reception in a computer-compatible form. Usually, the main disadvantage of a digital telemetry system is its high initial cost. However, because the U.S. Geological Survey is already recording data at many of its sites in BCD (Binary Coded Decimal) form utilizing an ADR (Analog-to-Digital Recorder), a large part of the cost--that required for analog-to-digital conversion--is eliminated. Furthermore, due to the less stringent transmission facility requirements, operating costs generally are lower than comparable analog systems. (Woodard-USGS)
W73-11815

POSSIBILITY OF USING STORAGE PRECIPITATION GAGES TO IMPROVE THE ACCURACY OF PRECIPITATION DATA IN THE UKRAINIAN CARPATHIANS (O VOZMOZHNOSTI UTOCHNENIYA KOLICHESTVA OSADKOV V UKRAINSKIKH KARPATAKH PO DANNYM SUMMARNYKH OSADKOMEROV),
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02B.
W73-11828

IN SITU SAMPLER FOR MARINE SEDIMENTARY PORE WATERS: EVIDENCE FOR POTASSIUM DEPLETION AND CALCIUM ENRICHMENT,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
F. L. Sayles, T. R. S. Wilson, D. N. Hume, and P. C. Mangelsdorf, Jr.
Science, Vol 181, No 4095, p 154-156, July 13, 1973. 2 fig, 11 ref.

Descriptors: *Sampling, *Pore water, *Connate water, *Bottom sediments, Sea water, Diagenesis, Water chemistry, Cores, Potassium, Calcium, Core drilling.

A device was developed for sampling the interstitial waters of deep sea sediments in situ. The sampler collects a series of samples over a depth of 1.5 meters in the sediment and thus makes possible the accurate delineation of chemical gradients in the pore waters. Samples collected in the North Atlantic show significant gradients of K and Ca. Interstitial solutions sampled between Ireland and Cape Cod, Massachusetts, are characterized by the depletion of K and the enrichment of Ca. (Knapp-USGS)
W73-11840

DEPTH INTERVALS AND TOPSOIL MOISTURE MEASUREMENT WITH THE NEUTRON DEPTH PROBE,
Royal Veterinary and Agricultural Coll., Copenhagen (Denmark).
For primary bibliographic entry see Field 02G.
W73-11841

MEASUREMENTS OF CURRENTS,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 02E.
W73-11850

IMPLICATIONS OF A SYSTEMS APPROACH TO OCEANOGRAPHY,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 06A.
W73-11868

ISOTOPE METHODS IN GROUNDWATER SCIENCE (ISOTOPENMETHODEN IN DER GRUNDWASSERKUNDE),
European Atomic Energy Community, Brussels (Belgium). Bureau Eurisotop.
For primary bibliographic entry see Field 02F.
W73-11929

USE OF SATELLITE IMAGERY FOR WILDLAND RESOURCE EVALUATION IN THE GREAT BASIN,
Nevada Univ., Reno. Remote Sensing Lab.
P. T. Tueller.
Available from NTIS Springfield, Va 22151 E-73-10019. Price $3.00 printed copy; $1.45 microfiche. Nevada University Remote Sensing Laboratory report, January 3, 1973. 9 p, 1 tab.

Descriptors: *Remote sensing, *Photography, *Satellites (Artificial), *Nevada, Instrumentation, Mapping, Photometry.
Identifiers: *ERTS.

Accomplishments of the University of Nevada ERTS program are summarized. A detailed quantification was made of crested wheatgrass seedings within the state of Nevada. Within each county seedings were identified, delineated, and quantified using the MSS seven band from September 13-17, 1972. This band has proven the most useful for identification and quantification of seedings. Large scale photography and reference maps verified many seedings, some of which were difficult to identify positively with ERTS imagery. Identification and quantification of water bodies is being attempted. Using ERTS imagery and the MSS seven band, most water bodies are easily identified. An increase or decrease in water quantity will be reflected in a corresponding increase or decrease of surface area. Fire scars, both recent and old, are being inventoried and monitored. A quantitative estimate of the number of acres burned may be obtained easily. The sequential nature of the ERTS data is particularly well adapted for this type of inventory. Sequential imagery aids in detecting changes in playas. Phreatophytic vegetation was partly quantified along the Truckee River and the Las Vegas Wash, using ERTS imagery. (Knapp-USGS)
W73-12021

EFFECT OF MULTIPLE SCATTERING ON RADIANT ENERGY TRANSFER IN WATERS,
Purdue Univ., Lafayette, Ind. Heat Transfer Lab.
For primary bibliographic entry see Field 01A.
W73-12080

MICROWAVE SIGNATURES OF FIRST-YEAR AND MULTIYEAR SEA ICE,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
P. Gloersen, W. Nordberg, T. J. Schmugge, T. T. Wilheit, and W. J. Campbell.
Journal of Geophysical Research, Vol 78, No 18, p 3564-3572, June 20, 1973. 3 fig, 1 tab, 12 ref.

Descriptors: *Sea ice, *Microwaves, *Remote sensing, *Ice cover, Instrumentation, Aerial photography, Temperature, Salinity.
Identifiers: Microwave radiometers.

A combination of remote sensing from an aircraft and simultaneous surface measurements confirm the feasibility of identifying old and new sea ice according to its emission of thermal radiation at wavelengths between 0.3 and 3 cm. Emissivity of first-year thick ice with a surface temperature of about 260K is 0.95 or greater for wavelengths between 0.81 and 11 cm; the emissivity of multiyear ice is 0.8 at 0.81 cm and 0.95 at 11 cm, increasing monotonically in this wavelength interval. The ease with which multiyear ice can be distinguished from first-year ice using a passive microwave radiometer was demonstrated by comparing mosaics prepared both from photographs and images of 1.55-cm radiation. (Knapp-USGS)
W73-12081

EDDY CORRELATION MEASUREMENTS OF EVAPORATION AND SENSIBLE HEAT FLUX OVER ARCTIC SEA ICE,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 02D.
W73-12083

A SUBMERSIBLE SPECTRORADIOMETER AND DATA ACQUISITION SYSTEM,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
For primary bibliographic entry see Field 05A.
W73-12135

AUTOMATIC METER READING USING EXISTING TELEPHONE CIRCUITS,
Utilities Telecommunications Council, Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-12145

A UNIFIED METHOD FOR THE RECONSTRUCTION OF SAMPLED DATA,
Florida Univ., Gainesville. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 05A.
W73-12147

RADIOMETER FOR AQUATIC USE,
Department of Agriculture, Lethbridge (Alberta). Research Station.
J. R. Allan, and R. G. Fuhrer.
Can J Plant Sci. Vol 52, No 3, p 405-408. 1972. Illus.
Identifiers: *Radiometer, *Instrumentation.

The radiometer of Gaudet and Damm (1968) is modified as a detachable, inexpensive, portable and waterproof light sensor that can be installed permanently in lentic and lotic environments.—Copyright 1972, Biological Abstracts, Inc.
W73-12185

THE EVALUATION AND APPLICATION OF C-14 DATING OF GROUNDWATER,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02F.
W73-12297

REMOTE SENSING STUDY OF THERMAL DISCHARGES TO LAKE MICHIGAN, WISCONSIN, ILLIONOIS, INDIANA, AND MICHIGAN.
National Field Investigations Center-Denver, Colo.
For primary bibliographic entry see Field 05B.
W73-12309

7C. Evaluation, Processing and Publication

DETERMINING IRRIGATION POTENTIAL - A COMPUTER MODEL,
For primary bibliographic entry see Field 03F.
W73-11734

USE OF SATELLITE IMAGERY FOR WILDLAND RESOURCE EVALUATION IN THE GREAT BASIN,
Nevada Univ., Reno. Remote Sensing Lab.
For primary bibliographic entry see Field 07B.
W73-12021

THE USE OF ERTS-1 IMAGERY IN THE NATIONAL PROGRAM FOR THE INSPECTION OF DAMS,
Cold Regions Research and Engineering Lab., Hanover, N.H.
H. L. McKim, T. L. Marlar, and D. M. Anderson.
Available from NTIS, Springfield, Va 22151 as AD-754 579 Price $3.00 printed copy; $1.45 microfiche. Special Report SR 183, December 1972. 16 p, 9 fig, 2 tab, 3 ref, append.

Descriptors: *Remote sensing, *Satellites (Artificial), *Dams, *Reservoirs, Surveys, Aerial photography, Photogrammetry, Drainage patterns (Geologic), Lakes.
Identifiers: *ERTS imagery.

ERTS-1 imagery can be useful in locating water bodies over 152 m in diameter. Dams on streams can be identified by an abrupt change in stream width. A linear termination on a water body is a reliable indication of a dam, particularly when it is inconsistent with the normal drainage pattern. Care must be exercised to avoid confusing cloud shadows with water bodies. However, the association of a cloud with its shadow usually can be accomplished since the sun angle is noted in the data given on each ERTS image. The location of water bodies, the size and shape of water bodies, identification of dam sites on major rivers, the direction of stream flow of major hydrologic networks, relative water depths, and gross sedimentation patterns may be determined from ERTS imagery. ERTS-1 imagery, in general, does not supply information suitable for determining dam height, type of dam construction, depth of water bodies, or location of water bodies less than 6 acres. (Knapp-USGS)
W73-12028

NATURAL RESOURCE INFORMATION SYSTEM, VOLUMES I AND II.
Boeing Computer Services, Inc., Seattle, Wash.
For primary bibliographic entry see Field 06A.
W73-12040

HYDRAULIC NETWORK ANALYSIS USING LINEAR THEORY,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
D. J. Wood, and C. O. A. Charles.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY7, Paper 9031, p 1157-1170, July 1972. 2 fig, 5 tab, 22 ref, append. OWRR B-017-KY (2).

Descriptors: *Pipe flow, *Closed conduit flow, *Hydraulic systems, *Head loss, Mathematical models, Equations, Fluid mechanics, Computer programs.
Identifiers: Hydraulic networks, Linear analysis.

A method of analyzing flow distribution in hydraulic networks is presented. Basically, this method uses a linearized head loss term which allows a network of n pipes to be described by a set of n linear equations which can be solved simultaneously for the flow distribution. Because of the linear approximations used, several trials will be required to get an accurate solution. This method of analyzing hydraulic networks is characterized by an assured convergence which is very rapid when compared to other available methods. One reason for this is that it is possible to compute a fairly accurate initial flow distribution and no initial estimates are required. In addition, the method applies directly to both closed loop systems and open-closed loop systems. The method is also easy to program for solution on a digital computer. (Woodard-USGS)
W73-12041

THE PREDICTION OF SOIL OCCURRENCE IN CERTAIN DESERT REGIONS OF THE SOUTHWESTERN UNITED STATES,
Soil Conservation Service, University Park, N. Mex.
For primary bibliographic entry see Field 02G.
W73-12256

INTERNATIONAL SYMPOSIUM ON UNCERTAINTIES IN HYDROLOGIC AND WATER RESOURCE SYSTEMS, VOL. I.
For primary bibliographic entry see Field 04A.
W73-12269

EVALUATION OF SEASONAL TIME-SERIES MODELS: APPLICATIONS TO MID-WEST RIVER FLOW DATA,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
A. I. McKerchar, and J. W. Delleur.
In: Proceedings (Vol I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 31-47, (1972) 4 fig, 2 tab, 13 ref.

Descriptors: *River flow, *Forecasting, *Stochastic processes, *Seasonal, *Ohio River, *Evaluation, *Hydrologic data, Time series analysis, Mathematical models, Monthly, Tributaries, Water resources development, Optimum development plans, Equations, Systems analysis.
Identifiers: Mid-west, Daily flows, Synthetic data.

Stochastic models are well fitted to hydrologic data: They enable forecasts of the data one and more time periods ahead, and they enable the generation of sequences of synthetic data. These techniques are of considerable importance to the design and operation of water resource systems. Short sequences of data lead to uncertainties in the estimation of model parameters and to doubts about the appropriateness of particular time series models; a premium is placed on models that are economical in terms of the number of parameters required. Two models that take account of seasonal and persistence effects in runoff data are described and fit 16 series of monthly flows for rivers that are tributaries to the lower Ohio River. These models are: (A) an autoregressive model, a conventional Thomas-Fiering type model, in which individual monthly means and standard deviations are explicitly accounted for; and (B) a multiplicative ARIMA (autoregression-integrated-moving-average) model of the type described by Box and Jenkins. Consideration of the forecasts shows that both models represent the seasonal variations in monthly means. However, model B does not account for the seasonal variability in monthly standard deviations; for this reason its utility is restricted. (See also W73-12269) (Bell-Cornell)
W73-12272

TECHNOLOGICAL UNCERTAINTY IN THE ECONOMIC EVALUATION OF NEW WATER RESOURCES,
Hawaii Univ., Honolulu. Coll. of Business Administration.
For primary bibliographic entry see Field 06A.
W73-12273

METHODS FOR ASSESSING VARIABILITY, WITH EMPHASIS ON SIMULATION DATA INTERPRETATIONS,
Naval Postgraduate School, Monterey, Calif.
D. P. Gaver.
In: Proceedings (Vol. *), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972, p 64-90, (1972). 18 tab, 8 ref.

Descriptors: *Simulation analysis, *Stochastic processes, *Monte Carlo method, *Estimating, *Variability, Computers, Equations, Distribution, Operation research, Mathematical models, Hydrology.
Identifiers: *'Jackknife' method, Antithetic variates technique.

The problem of assessing and comparing the variability of complex functions of random variable realizations is important in many applied areas, including hydrology. Difficulties stem from non-robustness: For example, the usual (normal distribution based) confidence limits for variances based on the chi-squared statistic often turn out to be narrow (non-conservative) and thus to falsely overstate confidence when data is non-normal. Promising results are described of some exploratory simulations to evaluate the small-sample characteristics of new variance (and also mean) estimates. Investigated is the performance of one useful method, the 'jackknife' of Quenouille and Tukey, for setting confidence limits on the variance or standard deviation of an unknown distribution. By using empirical sampling employing a computer, it is shown that the jackknife method seems to be an improvement upon normal-theory methods. Finally, the performance of the jackknife method for anlyzing a stochastic simulation experiment is discussed. The simulation makes use of the Monte Carlo technique known as antithetic

variates; this technique is introduced in order to improve simulation efficiency. (See also W73-12269) (Bell-Cornell)
W73-12274

EVALUATION OF PREDICTION ERROR PROBABILITIES FROM STOCHASTIC MODELS BY SIMULATION,
Kentucky Univ., Lexington.
For primary bibliographic entry see Field 04A.
W73-12275

FLOOD EVALUATION - CAN STOCHASTIC MODELS PROVIDE AN ANSWER,
Birmingham Univ. (England). Dept. of Civil Engineering.
N. Kottegoda.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972, p 105-114, (1972). 3 fig, 8 ref.

Descriptors: Floods, *Flood data, *Evaluation, *Stochastic processes, *Monte Carlo method, *Climatic zones, Design, Flood peak, Probability, Distribution, Mathematical models, Systems analysis, Meteorological data, River flow.
Identifiers: *Data generation, *Wye River (Wales), British Isles, Value data, Autoregressive models, Pearson-type distributions, Seasonal, Historical data.

Stochastic analysis of floods is a field of research which has been comparatively untouched. The fitting of theoretical distribution functions to series of extreme value data has serious limitations. Inherent uncertainties and misconceptions mar the probable maximum precipitation method used in the design of major spillways. Data generation is a fruitful field of research. Monte Carlo or data generation methods offer a wide array of stochastic process for the investigation of extreme events. In this study, data is generated on the basis of an autoregressive model which seems appropriate when the climatological zone of the British Isles is considered. The fourth order autoregressive model is fitted to a five-day riverflow series from a Welsh catchment. The Pearsonian family of distribution functions is closely examined; appropriate Pearson-type distributions are fitted seasonally using an exact and rapid transformation procedure. The generated pentad data is segmented to form daily flows. Results from the application to a 35 year record of the river Wye at Rhyader in mid-Wales are compared with Poisson and physical techniques. (See also W73-12269) (Bell-Cornell)
W73-12276

BIAS, ILLUSION, AND DENIAL AS DATA UNCERTAINTIES,
Geological Survey, Washington, D.C.
J. R. Slack.
In: Proceedings (Vol. I), International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, December 11-14, 1972. p 122-132, (1972). 15 ref.

Descriptors: *Synthetic hydrology, *Streamflow, *Stochastic processes, *Water resources, Planning, Constraints, Estimation, Model studies, Systems analysis, *Risks.

The application of mathematical models to the generation of synthetic flows can lead to a number of problems concerning the adequacy of synthetic flow traces in water resources planning. A stochastic model is usually selected for its theoretical ability to preserve certain statistics and its apparent analogy with the real-world process. The successful application of the model requires that the questions of bias, illusion, and denial be resolved. Bias inherent in the generating process must be discovered and overcome; while a given model will in theoretical expectation for infinite samples preserve a given statistic, the model may produce finite samples having on the average statistics different from the 'expected' statistics. The modeler must understand that every historic record is no more than an illusion of the real world; a single finite realization (historic record) of a random process rarely has sample estimates equal to the population parameters. The possibility that a model may deny itself must be explored. Many stochastic models are quite capable of producing finite samples having statistics which are outside the domain of driving parameters acceptable to the model. Each of these uncertainties is due to the unsteady nature of finite realization of a random process. Each is an artifact of the assumed model. (See also W73-12269) (Bell-Cornell)
W73-12278

REDUCTION OF UNCERTAINTIES IN AUTOCORRELATION BY THE USE OF PHYSICAL MODELS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02A.
W73-12283

EFFECT OF LENGTH OF RECORDS OF MONTHLY FLOWS ON THE FIRST SERIAL CORRELATION COEFFICIENT,
Asian Inst. of Tech., Bangkok (Thailand).
For primary bibliographic entry see Field 02E.
W73-12285

UNCERTAINTIES IN POINT AND AREAL SAMPLING OF PRECIPITATION AND THEIR IMPORTANCE IN HYDROLOGIC COMPUTATIONS,
Ministry of Agriculture and Natural Resources, Nicosia (Cyprus). Dept. of Water Development.
For primary bibliographic entry see Field 02B.
W73-12290

SPACE-TIME UNCERTAINTIES IN PRECIPITATION MEASUREMENT,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 02B.
W73-12293

HYDROGEOLOGIC CHARACTERISTICS OF THE VALLEY-FILL AQUIFER IN THE JULESBURG REACH OF THE SOUTH PLATTE RIVER VALLEY, COLORADO,
Geological Survey, Lakewood, Colo. Water Resources Div.
For primary bibliographic entry see Field 02F.
W73-12296

GREAT LAKES WATER LEVELS, 1970, DAILY AND MONTHLY AVERAGE WATER SURFACE ELEVATIONS.
National Ocean Survey, Detroit, Mich. Lake Survey Center.

Available from NTIS, Springfield, Va. 22151 as COM-73 10271 Price $3.00 printed copy; $1.45 microfiche. National Ocean Survey Report, August 1972. 108 p.

Descriptors: *Water level fluctuations, *Great Lakes, *Basic data collections, Gaging stations, Networks, Elevation, Surface waters, Water level recorders, Lakes, Sites, Rivers, Tributaries, Inflow.

Lake Survey Center Great Lakes and tributary water level gage records are presented for daily and monthly average levels for each of the 60 sites in the network during the 1970 calendar year. In a separate table the highest and lowest daily average are shown for the month. In addition a frequency distribution table of daily average levels shows the number of times each month the recorded levels were above a specified elevation. The gages record water levels in either an analog or a digital form a strip charts which are retained for a period of ten years. Recorded hourly values were used to compute the daily averages, and the monthly values were compiled from the daily averages. (Woodard-USGS)
W73-12298

PRECIPITATION PROBABILITIES FOR KENTUCKY,
Kentucky Agricultural Experiment Station, Lexington.
For primary bibliographic entry see Field 02B.
W73-12304

NUMERICAL MODEL STUDIES OF THE ST. LAWRENCE RIVER,
National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering.
For primary bibliographic entry see Field 02L.
W73-12313

MODULES FOR INTEGRATED AQUATIC MODELING,
For primary bibliographic entry see Field 05B.
W73-12325

08. ENGINEERING WORKS

8A. Structures

MECHANISMS OF ENERGY ABSORPTION IN SPEICAL DEVISES FOR USE IN EARTHQUAKE RESISTANT STRUCTURES,
California Univ., Berkeley.
J. M. Kelly, R. I. Skinner, and A. J. Heine.
Bull N Z Soc Earthquake Eng, Vol 5, No 3, p 63-88, Sept 1972. 20 fig, 2 tab, 14 ref.

Descriptors: *Energy absorption, *Seismic design, Structural design, Steel structures, Reinforced concrete, Plastic deformation, Laboratory tests, Fatigue (Materials), Flexibility, Ductility, Dynamic loads, Fatigue (Materials), Torsion bridge piers.

A structure designed to resist earthquake attack must have the capacity to dissipate kinetic energy. Recent research has shown that beam-to-column connections in steel and reinforced concrete frames are not reliable when subjected to cyclic loading. Throughout the world, efforts are directed toward increasing the reliability and energy absorption capacity of structural connections. An alternative is to separate the load-carrying function of the structure from the energy-absorbing function and to determine whether special devices could be incorporated into the structure with the sole purpose of absorbing the kinetic energy. The 3 energy-absorbing devices tested included the rolling of strips, torsion of square and rectangular bars, and the flexure of short, thick beams. Characteristics of primary importance were: (1) load displacement relations, (2) energy absorption capacity, and (3) fatigue resistance. Tests show that the plastic torsion of mild steel is very efficient for energy absorption. The other 2 mechanisms studied were both less efficient and less reliable than torsion, but are adaptable to more compact devices and are readily accessible for replacement after use. (USBR)
W73-11725

THE REVIN PUMPED-STORAGE PLANT,
Electricite de France, Paris.
For primary bibliographic entry see Field 08C.
W73-11726

SHIELD TUNNELLING WITH LINER PLATES,
Wayss und Freytag KG, Frankfurt-am-Main (West Germany).
O. E. Engelmann, and D. Mornhinweg.
Tunnels Tunnelling, Vol 4, No 6, p 525-531, Nov 1972. 8 fig, 2 chart, 4 ref.

Descriptors: *Tunnel construction, Tunneling, Tunnel lining, Tunnels, Tunneling machines, Tunnel design, Load distribution, Construction methods, Stress analysis.
Identifiers: *Tunnel supports, *Liner plates, Boring machines, Shields, Vertical loads, Axial loads, Construction methods, Foreign construction, Buckling, Stress analysis.

Use of the shield tunneling method with steel liner plates in Germany is described. This method has proved highly successful for driving small diameter tunnels in soft ground, where excessive ground water was encountered, and when tunneling under compressed air conditions was advantageous. The new technique was found to be competitive in cost and is better suited to soft ground tunneling. A general description of the liner plates and strength analysis of the flexible liner plates to earth pressure are presented. Determination of the load-carrying capacity of liner plates using a Terzaghi method and comprehensive tests by the Illinois Institute of Technology, Chicago, are discussed. From these test, diagrams were made for each plate thickness showing the load under which different diameter liner plates collapse by buckling. Details of a shield tunneling machine are illustrated; 3 tunneling projects using this method are described. (USBR)
W73-11732

NEW CONTINUOUS-FLOW PROCESS FOR BLAST-HOLE DRILLING IN HYDRAULIC-ENGINEERING, RECLAMATION, AND WATER--RESOURCES CONSTRUCTION,
Severyni Nauchno-Issledoatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
For primary bibliographic entry see Field 08H.
W73-11733

DEFLECTIONS OF PRESTRESSED CONCRETE BRIDGES IN JAPAN,
Tokyo Univ. (Japan).
For primary bibliographic entry see Field 08F.
W73-11735

APPLICATION OF CATHODIC PROTECTION,
Texas Eastern Transmission Corp., Shreveport, La.
For primary bibliographic entry see Field 08G.
W73-11736

THE HENDRIK VERWOERD DAM OF THE ORANGE RIVER PROJECT, SOUTH AFRICA.
South African Embassy, London (England).

Water Eng, Vol 76, No 919, September 1972. 7 p, 1 map, 8 photo.

Descriptors: *Tunnels, *Radial gates, Water resources development, Sedimentation, Sediment control, Hydraulic structures, Hydroelectric power, Multiple purpose projects, Hydraulic turbines, Recreation, Flood control, Dam construction, Design, Dam design, Foreign projects, Concrete dams.
Identifiers: *Double-curvature arch dams, *Intake towers, Construction methods, South Africa, *Hendrik Verwoerd Dam (South Africa), *Orange River Dev Proj (South Africa), Orange River (South Africa).

Features of the Hendrik Verwoerd Dam, the principal component of the Orange River Development Project, are described. This dam impounds the largest man-made lake in South Africa behind a double-curvature main arch and 2 concrete gravity flank walls forming artificial gravity abutments. Approved in 1962, the project is scheduled for completion about 1990. Water from the project will be used for irrigation, urban and industrial purposes, hydroelectric power, and recreation. Design features of the dam and the intake for the Orange-Fish Tunnel are given. The Orange-Fish Tunnel, the second-longest (51.4 mi) water conduit in the world, will divert water from the Orange River Basin to the Eastern Cape Province for irrigation and industrial use. Because of the heavy silt load carried by the river, special considerations were given to sediment storage. A program to educate farmers in modern soil conservation methods and improved farming techniques has been instituted as an effective method of combating siltation by preventing soil erosion. Ultimately the installed capacity will be 320 mw. (USBR)
W73-11740

AN UNDERGROUND STORAGE RESERVOIR AS AN ARTIFICIAL STRUCTURE,
Energoprojekt, Belgrade (Yugoslavia).
J. Bozidar.
Water Power, Vol 24, No 10, p 375-381, Oct 1972. 7 fig.

Descriptors: Tunnels, Underground storage, Underground structures, Reservoirs, Hydroelectric powerplants, Hydraulic structures, *Power system operation, Fluid flow, Hydraulics, Unsteady flow, Turbines, Generators, Foreign projects, Water resources development, Reservoir operation, Surge tanks.
Identifiers: Yugoslavia, *Underground water storage, *Transient flow.

Lack of suitable damsite for the Vrla 3 hydroelectric powerplant in Yugoslavia led to the construction of a network of interconnecting tunnels for operation as an underground storage reservoir. Located at the beginning of the Vrla 3 supply tunnel, the underground storage tunnel has a total length of 2,000 m and a capacity of 30,000 cu m. The 2.75-m-dia supply tunnel is 7,333 m long and is also used partly as a storage reservoir. Design discharge is 16 cu m per sec for 2 generating units. Using half the design discharge, 1 unit has been running since 1957; operation of the reservoir has been satisfactory. The supply tunnel is designed to function normally under pressure during power generation, and as a free surface channel when the reservoir is empty. To permit tunnel operation in 2 different regimes. 2 basic problems to be solved were: (1) to protect the penstock against the entrainment of air from the surge tank and the supply tunnel during operation, and (2) to assure rapid and efficient discharge of air from the tunnel during filling. Analyses of model investigations of the transient flow occurring during the emptying and filling of the tunnel are presented. Possible operating difficulties with the system when the second unit is placed in service in 1973-75 are discussed. (USBR)
W73-11741

AN APPROACH TO UNDERGROUND CONSTRUCTION,
D'Appolonia (E.) Consulting Engineers, Inc., Pittsburgh, Pa.
T. L. Neff.
Paper, 15th Annu Meeting Assoc Eng Geol, Kansas City, Mo, Oct 1972. 24 p, 3 fig, 9 ref.

Descriptors: *Costs, *Contract administration, Construction, *Tunnel construction, Competitive prices, Scheduling, Design, Contracts, Construction costs, Management, Environmental engineering, Research and development, Specifications, Tunneling, Tunnels.
Identifiers: *Cost savings, Underground openings.

Underground construction has greatly increased because of environmental advantages, especially in and near metropolitan centers. However, the underground industry is plagued by inefficiency and lack of flexibility, resulting in cost and time overruns. One of the inherent problems is having to deal with subsurface conditions that cannot be completely known prior to construction. The projected dollar volume of underground construction in the next decade makes seeking immediate ways to lower the cost of such construction imperative. Improvements must be achieved both in development of new and better technology, especially in the application of technology to construction projects. Clearly a breakthrough is needed. One possibility for lowering underground construction costs is a contract that permits engineered construction. A negotiated incentive contract that rewards innovation and efficiency has been proposed. To enable the suggested approach to succeed, strict controls on contingencies, costs, and schedules are necessary. The integrated civil engineering project and the observational approach could provide a sound basis for achieving required controls. (USBR)
W73-11744

THREE-DIMENSIONAL BEHAVIOR OF A CENTRAL CORE DAM,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. B. Palmerton, and G. Lefebvre.
Available from the National Technical Information Service as AD-756 443, $3.00 in paper copy, $1.45 in microfiche. Research Report S-72-1, December 1972. 62 p, 34 fig, 14 ref.

Descriptors: *Dam design, *Design criteria, *Engineering structures, *Stress analysis, Strain, Computer models, Computer programs, Structural analysis, Structural behavior, Valleys.

A three-dimensional finite element computer program is used to investigate the stress and displacement conditions of a dam situated in a narrow steep-walled valley. Nonlinear stress-strain behavior and incremental construction of the dam are included in the analyses. The three-dimensional analyses are compared to the plane strain behavior of a transverse section of the dam and indicate significant differences in the stress behavior. The differences are primarily due to the effect of arching caused by the valley walls. A Stress conditions leading to conditions favorable to horizontal hydraulic fracturing are discussed. (Woodard-USGS)
W73-11822

INVESTIGATION OF MUDFLOWS IN THE CHEREMOSH RIVER BASIN IN CONNECTION WITH DESIGN OF THE ROSTOKI RESERVOIR (ISSLEDOVANIYE SELEY V BASSEYNE R. CHEREMOSH V SVYAZI S PROYEKTIROVANIYEM ROSTOKINSKOGO VODOKHRANILISHCHA),
Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02J.
W73-11831

BOWIE DAM AND LAKE PASCAGOULA RIVER BASIN, MISSISSIPPI AND ALABAMA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Mobile, Ala.

August 1972. 69 p, 1 map, 1 append.

Descriptors: *Multiple-purpose reservoirs, *Mississippi, *Environmental effects, *Flood control, Reservoirs, Recreation, Flood protection, Multipurpose projects, Water quality control, Agriculture, Land use, Water supply, Wildlife habitats, Dam construction, Earth dams, Water supply development, Reservoir construction, River basin development, Alabama.
Identifiers: *Environmental Impact Statements, *Pascagoula River basin (Mississippi-Alabama).

This multipurpose reservoir project on Bowie Creek in Mississippi is designed for flood control, water supply development, general recreation, and fish and wildlife enhancement. Adverse environmental effects include loss of 5,500 acres of agricultural and forest lands and its associated wildlife habitat, as well as loss of free-flowing stream fisheries and the disruption of inhabitants. Alternative sites and no-development were considered; however, the single purpose projects proved to be less efficacious or economically infeasible. The project would provide extensive flood protection, a dependable water supply, and high quality recreation areas. Additional conversion of woodland to agricultural land may be induced by project implementation. Overall, the basic objective of the program is to plan for the best use, or combination of uses, of water and related land resources to meet all foreseeable short and long-term needs. (Mockler-Florida)
W73-11977

MILLDAMS AND RACES.
For primary bibliographic entry see Field 06E.
W73-11992

BREVARD COUNTY BEACH EROSION CONTROL PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from National Technical Information Service, U.S. Dept of Commerce as EIS-FL-72-5590-F, $3.75 in paper copy, $1.45 in microfiche. May 1972. 29 p, 1 plate.

Descriptors: *Erosion control, *Environmental effects, *Florida, *Beach erosion, Dredging, Water quality, Recreation, Aquatic animals, Coastal engineering, Shore protection, Sands, Shores, Tidal effects, Benthic fauna, Waves (Water), Littoral drift, Jetties, Turbidity, Beaches.
Identifiers: *Environmental Impact Statements, *Brevard County (Fla).

This project consists of partial restoration of 2.8 miles of Atlantic Ocean shoreline at the city of Cape Canaveral and partial restoration and periodic nourishment of 2 miles of shore at the cities of Indialantic and Melbourne Beach in Brevard County, Florida. Future nourishment of the Cape Canaveral reach would be accomplished by the authorized sand-transfer plant for Canaveral Harbor. About 988,000 cubic yards of material will be initially dredged from offshore and placed on the beach at Cape Canaveral and approximately 603,000 cubic yards of initial fill will be placed on the beach at Indialantic and Melbourne. Dredging will temporarily degrade water quality, cause the beach to be temporarily closed for public use, and will destroy most benthic animals in bottom sediments and cover those in the beach nourishment area. Consideration was given to several alternative plans but it was finally determined the proposed project was the only one which was economically feasible and capable of accomplishing the ultimate objectives. (Mockler-Florida)
W73-11997

ENGINEERING REPORT ON MASON STREET AND MILBANK AVENUE DRAINAGE AND DRAINAGE SYSTEMS, GREENWICH, CONNECTICUT.
Gannett Fleming Corddry and Carpenter, Inc., Harrisburg, Pa.

Greenwich Department of Public Works, Greenwich, Connecticut, March 1, 1972. 37 p, 6 fig, 2 append.

Descriptors: *Storm drains, *Drainage systems, *Evaluation, *Urban drainage, *Flood control, *Sewerage, Storm runoff, Urbanizations, Connecticut, Pipes, Outlets, Tides.
Identifiers: *Greenwich (Conn).

The Town of Greenwich, Connecticut has experienced stormwater flooding in the Mason Street and Milbank Avenue area. This has resulted from increased urbanization and the inability of existing drainage facilities to accept and convey the increased amounts of stormwater runoff. The capacity of existing storm drainage systems in the area was investigated and a preliminary design of a storm drainage system was prepared. The area contains 165 acres, all urbanized. Two separate storm drainage systems exist--along Mason Street where the area is primarily commercial, and along Milbank Avenue where it is predominately a residential area. The terrain is rolling, sloping from the north down to sea level at Long Island Sound. Preliminary designs and cost estimates were made of alternate drainage systems to adequately handle stormwater runoff from the 10, 25, and 50-year storms. Cost vs. storm frequency relationships were analyzed and a system was recommended to handle the runoff from a 10-year storm in the northern and eastern half of the study area. A 25-year design storm event was selected for the southern and western half of the area. As part of the design considerations, tide levels had to be known, since high tides at the sewer outlets reduce the discharge capacity of the drainage system. Total system cost was estimated at $3.4 million with construction extending over a seven-year period. Practically all existing storm drains are recommended for replacement. (Poertner)
W73-12011

THE USE OF ERTS-1 IMAGERY IN THE NATIONAL PROGRAM FOR THE INSPECTION OF DAMS,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 07C.
W73-12028

RED RIVER EMERGENCY BANK PROTECTION, LOUISIANA, ARKANSAS, AND TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 04A.
W73-12196

LITTLE RIVER INLET NORTH CAROLINA AND SOUTH CAROLINA--NAVIGATION (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Charleston, S.C.
For primary bibliographic entry see Field 04A.
W73-12202

8B. Hydraulics

CRITERIA FOR STABLE EARTH CHANNEL DESIGN,
Soil Conservation Service, Upper Darby, Pa.
G. E. Oman.
Paper 72-763, 1972 Winter Meeting American Society of Agricultural Engineers, Chicago, Illinois, December 1972. 15 p, 12 fig, 5 ref.

Descriptors: *Channel erosion, *Bank erosion, *Tractive forces, Canal design, Irrigation canals, Channel flow, Design flow, Bank stability, Design criteria, Hydraulic design, Soil erosion, Floodways, Surface drainage, Channels, Canals, Erosion.
Identifiers: Erosion strength, Channel design, Stable channels, Unlined channels, Sediment concentration.

In determining stability of an earth channel against erosion, the Soil Conservation Service uses either the allowable velocity or the allowable tractive stress methods. Both are based on the principle of the threshold of particle movement. The allowable velocity method considers: suspended load in the water, earch material of the channel, depth of the flow, slope of the channel bank, curvature of the channel, and frequency of the design flow. Equations and curves for computing channel stability by the tractive stress method are presented. Problems encountered in using the 2 methods include: (1) criteria are not always explicit; (2) sediment load quantity and effects must be estimated; (3) earth material varies along the channel; (4) consideration must be given for vegetation growing along the channel; (5) methods do not apply to non-cohesive fine-grained materials and dispersable cohesive soils; and (6) corrections based on the roll down effect of the particles are based on limited data. Further evaluation of the performance of existing channels is encouraged. (USBR)
W73-11746

CHANNEL CONDITIONS, DEVIL'S ISLAND REACH, MISSISSIPPI RIVER, MISSOURI AND ILLINOIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. J. Franco, and C. D. McKellar, Jr.
Available from NTIS, Springfield, Va. 22151 as AD-756 442, Price $3.00 printed copy; $1.45 microfiche. Technical Report H-73-1, February 1973. 29 p, 1 fig, 13 plate.

Descriptors: *Engineering structures, *Canal construction, *Mississippi, *Channels, Bypasses, Hydraulic models, Navigation, Model studies, Channel morphology, Depth, Width, Dikes, Evaluation, Ecology, Environmental effects, Fish, Missouri.
Identifiers: *Devil's Island Reach (Mississippi River).

The Devil's Island Reach of the Mississippi River is located about 5 miles upstream of Cape Girardeau, Missouri, between miles 55.0 and 68.0. A movable-bed model with scale ratios of 1:400 horizontal and 1:100 vertical, reproducing approximately 13.0 miles of the Mississippi River, was used to develop a channel of project dimensions through the reach. Results of the investigation indicated that: contracting the channel in this reach to a control width of 1500 ft should generally provide adequate channel depths and alignment; the control width can be reduced to less than 1500 ft to improve the depth and alignment of the channel over crossings with dikes of lower elevation than those used for the 1500-ft contraction; the cost of dike construction can be reduced by use of the stepped-down principle in the design of dike systems; the plan developed during this study produced the best overall results insofar as navigation is concerned; and the habitat of fish and wildlife can be enhanced by the use of properly designed longitudinal sections on some of the spur dikes. (Woodard-USGS)
W73-11821

A FIELD INVESTIGATION OF ROLLOVER FISH PASS, BOLIVAR PENNINSULA, TEXAS,
Texas A and M Univ., College Station. Coastal and Ocean Engineering Div.
S. H. Prather, and R. M. Sorensen.
Available from NTIS, Springfield, Va 22151 as COM-73-10157, Price $3.00 printed copy, $1.45 microfiche. Report No 155 (Sea Grant Publication), 1972. 116 p, 45 fig, 3 tab, 39 ref, 2 append. NOAA TAMU-SG-72-202.

Descriptors: *Hydraulics, *Inlets (Waterways), *Bays, *Gulf of Mexico, *Texas, Fish passages, Tidal effects, Sediment transport, Water circulation, Hydrologic data, Hydraulic properties, Discharge (Water), Flow rates, Sediments, Particle size, Canals, Engineering structures, Evaluation.
Identifiers: *Rollover Fish Pass (Tex), Bolivar Peninsula (Tex).

A field study of Rollover Fish Pass, an artificial tidal inlet connecting Galveston East Bay, Texas, with the Gulf of Mexico, was conducted. The objectives were (1) to evaluate the flow and stability characteristics of the inlet, (2) to investigate the propagation of the tidal wave through the connected bay system, and (3) to evaluate the effect of the inlet on tidal fluctuations and flushing of East Bay. Field work included hydrographic surveys of the inlet and adjacent Gulf beaches, collection and analysis of sediment samples from the inlet and beaches, measurement of tidal fluctuations at selected locations in East Bay, and current measurements in the inlet. Tidal data from the Gulf, provided by the Galveston District, Corps of Engineers, were analyzed along with the field data. The water exchange through the pass is of sufficient magnitude to flush or circulate the waters in the upper end of East Bay, when considered over a long time period. This exchange is probably the greatest contribution the pass makes to the bay system and, by itself, makes the inlet valuable to the area concerned. (Woodard-USGS)
W73-11854

SHOALING CONDITIONS, ST. LOUIS HARBOR, MISSISSIPPI RIVER,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. J. Franco.
Available from NTIS, Springfield, Va 22151 as AD-752 421, Price $3.00 printed copy, $1.45 microfiche. Technical Report H-72-7, November 1972. 56 p, 1 fig, 34 plate.

Descriptors: *Harbors, *Navigation, *Channel improvement, *Mississippi River, *Missouri, Model studies, Shoals, Engineering structures, Design criteria, Channel morphology, Water control, Depth, Locks, Dams.
Identifiers: *St. Louis (Mo), Shoaling, Harbor improvement.

Difficulties encountered during low-flow periods of the Mississippi River in the vicinity of St. Louis, Mo., led to the authorization of studies to determine the advisability of providing improved, commercial harbor facilities. The purposes of the model study were to determine the causes of the shoaling in the harbor and docking areas and to develop plans that could be used to eliminate or reduce shoaling in these areas and in the lower entrance to the Chain of Rocks Canal. The model used was of the movable-bed type, constructed to scales of 1:250 horizontal and 1:100 vertical and reproducing the reach of the Mississippi River and adjacent overbank areas between miles 191.0 and 169.9. Improvement in the conditions along the city front can be obtained by closing the channel along the left side of Mosenthien Island, by extending training structures into the channel on the right side of Mosenthien Island and the channel along the city front, and by constructing a lock and dam structure downstream of the harbor area. (Woodard-USGS)
W73-11856

DETERMINING THE BEST SIZES OF THE OPEN CUT CANALS USED IN HYDROAMELIORATIONS,
For primary bibliographic entry see Field 06A.
W73-11870

A MODEL OF SEASONAL CHANGES IN TOTAL NITROGEN CONCENTRATION IN THE LAKE WINGRA WATER COLUMN,
Wisconsin Univ., Madison. Inst. for Environmental Studies.
E. H. Dettmann.
Available from NTIS, Springfield, Va., as EDFB-IBP-72-12; $4.00 in paper copy, $1.45 microfiche. Report EDFB-IBP-72-12, May 1973. 32 p, 12 fig, 17 ref.

Descriptors: *Nitrogen cycle, *Nitrogen fixation, *Aquatic environment, *Lakes, Mathematical models, Forecasting, Seasonal, Sedimentation, Aquatic bacteria, Nitrogen fixing bacteria, Algae, Balance of nature, Limiting factors, Cycling nutrients.
Identifiers: Lake Wingra (Wis).

The seasonal variation in the N content of lake water was modelled. The feedback loop structure determines the time of two maxima predicted by the model. Feedback control on hydrologic N export limits the maximum occurring in late winter. The time of the summer maximum is predicted too early, possibly because of an inaccurate determination of the N sedimentation rate, neglect of the effect of macrophytes, or denitrification processes in the water. The importance of remineralization at sediment surfaces suggests further study of aquatic microbial remineralization. Further extensions of the model will permit coupling with modelling of the biomass and of P. (Bopp-ORNL)
W73-11911

RESISTANCE LOSSES IN NONCIRCULAR FLOOD CONTROL CONDUITS AND SLUICES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
R. G. Cox.
Available from NTIS, Springfield, Va 22151 AD-755-821 Price $3.00 printed copy; $1.45 microfiche. Miscellaneous Paper H-73-1, January 1973. 18 p, 6 fig, 2 tab, 11 ref.

Descriptors: *Pipe flow, *Closed conduit flow, *Roughness (Hydraulic), *Head loss, *Energy dissipation, Hydraulics, Hydraulic design, Hydrodynamics.

In very smooth and in very rough noncircular conduits, conduit cross-section shape has a large effect on fluid flow resistance losses. The conduit shapes normally encountered in Corps of Engineers design of flood control projects were tested. The shape effect in these conduits can be neglected for all practical purposes. Also the concept of equivalent hydraulic diameter can be used with confidence for rectangular conduits having aspect ratios (height to width) between 0.5 and 2. (Knapp-USGS)
W73-12027

HYDRAULIC NETWORK ANALYSIS USING LINEAR THEORY,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
For primary bibliographic entry see Field 07C.
W73-12041

POTENTIAL RESERVOIR SITES FOR WATER SUPPLY IN ALABAMA, A PROGRESS REPORT,
Geological Survey of Alabama, University.
L. B. Peirce, and W. E. Smith.
Available from NTIS, Springfield Va. 22151 as PB-213 869 Price $3.00 printed copy; $1.45 microfiche. Preliminary Report, April 1972. 28 p, 2 fig, 1 tab, 5 ref. ADO WRP-71-3.

Descriptors: *Reservoir sites, *Pre-impoundment, *Alabama, *Water supply, Investigations, Projections, Evaluation, Topography, Geology, Hydrology, Drainage area, Streamflow, Water yield, Dams, Design criteria, Water storage, Groundwater resources, Economics, Surface waters.
Identifiers: *Potential reservoir sites (Alabama).

Projections of water requirements in Alabama to the year 2020 indicate that the total commitment for water supply will be approximately 7 bgd greater than in 1970. An increase of this magnitude in the dependable water supply will necessitate a substantial further development of the State's water resources. An awareness of the locations and general characteristics of sites for water-supply reservoirs is a prerequisite in the formulation of any long-range plan for the integrated development of Alabama's land and water resources. Such knowledge is necessary in order that alternative uses of potential reservoir sites, either as land areas or as water areas can be recognized and the relative benefits compared. For example, is a potential reservoir site more beneficially used as a reservoir or as farmland, a wildlife refuge, or an industrial park. Or, if water supply is clearly the need and a potential reservoir site is available, will the reservoir offer advantages over a groundwater supply that might also be available. The inventory of potential reservoir sites was begun in June 1971. (Woodard-USGS)
W73-12073

ENVIRONMENTAL GUIDE FOR THE U.S. GULF COAST,
National Climatic Center, Ashville, N.C.
For primary bibliographic entry see Field 06G.
W73-12310

8C. Hydraulic Machinery

SONIC CAVITATION STUDIES ON MODEL AND PROTOTYPE WATER TURBINES,
Hydro-Electric Commission, Tasmania.
G. J. Causon.
Inst Eng, Aust, Mech Cham Eng Trans, Vol MC8, No 1, p 24-30, May 1972. 13 fig, 1 tab, 10 ref.

Descriptors: *Cavitation, *Hydraulic turbines, *Francis turbines, *Bubbles, *Collapse, Model studies, Prototype tests, Turbine blades, Turbine runners, Laboratory tests, Frequency, Hydraulic machinery, Sound waves, On-site tests.
Identifiers: *Kaplan turbines, Sonic pickups, Frequency characteristics, Specific speed, Air bubbles, Correlation, Accuracy, Vacuum, Turbine efficiency, Test results.

To assess cavitation, sonic tests on models and prototype of both Francis and Kaplin turbines were performed and compared. Sonic measurements are shown to reflect accurately the onset of cavitation and, therefore, are more useful than conventional measurements of efficiency. The characteristic frequency of cavitation and its changing form with reduced suction conditions are discussed in terms of both model and prototype tests. Good correlation was obtained between model and prototype tests, confirming adequacy of the similarity laws applied. An increase in sound level can accurately fix inception of cavitation in both model and prototype turbines. The tests indicate very small changes in sound level occur between very high cavitation coefficient values and the cavitation coefficient value just before onset of cavitation. (USBR)
W73-11720

THE SPARKING OF LIGHTNING ARRESTERS DUE TO CONDUCTIVE CONTAMINANTS,
Iowa State Univ., Ames.
E. Nasser.
Journal of the Franklin Institute, Vol 294, No 6, p 469-481, Dec 1972. 7 fig, 9 ref.

Descriptors: *Lightning arresters, *Flashover, Laboratory tests, Electrical impedance, Electrical resistance, Electrical equipment, Surges.
Identifiers: *Contaminants, *Valves (Electrical), *Breakdown, *Protection (Electrical), Lightning protection, Lightning surges, Electrical insulation, Sparks, Wet condition, Leakage current, Spark gaps, High voltage, Overvoltage, Transients, Electric discharges, Contamination, Test results.

Overvoltage protection valves and lightning arresters are used in a variety of electrical systems ranging from communication to power, and from sea level to high altitude application. When a transient over-voltage occurs, these devices must conduct the excessive charge to ground, thereby protecting valuable network elements from damage by the transient overvoltage. Flawless operation of these devices is required for reliability of any electrical system. Study of lightning arrester performance under the effects of conductive surface contaminants reveals deterioration of the sparking threshold. Under certain conditions, partial sparking has occurred intermittently but persistently, sometimes causing failure of the arrester because of insulation breakdown. This phenomenon was analyzed using nonlinear characteristics of different types of gas discharges both within the arrester and the contaminant. The arrester was represented by 4 different models depending on mode of operation. Quantitive data were obtained on the percentage threshold drop of a particular arrester caused by a severe contaminant. Test results are presented. (USBR)
W73-11722

THE EFFECT OF VALVE AREA GAIN ON THE PERFORMANCE OF THE HYDRAULIC SERVOMECHANISM,
Trent Polytechnic, Nottingham (England).
J. Montgomery, and H. R. Martin.
Paper 72-WA/Fics-7, ASME Winter Annual Meeting, New York, NY, Nov 1972. 6 p, 9 fig, 13 ref.

Descriptors: *Orifices, *Valves, Hydraulic machinery, Control systems, Mechanical engineering, Frequency, Cavitation, Performance, Model studies, Stability, Computer models, Pressure, Viscosity, Friction, Flow control, Automatic control.
Identifiers: *Fluidics, *Servomechanics, *Fluid flow, Amplitude, Peak valves, Damping.

In the theoretical analysis of the hydraulic servomechanism a decision has to be made whether to model rectangular or circular ports in the spool valve. This investigation shows that unless the stability of the system is to be analyzed, modeling circular orifices is a complication that can be avoided because: (1) choice of orifice affects the amplitude response only when the inertia load factor is low and then only at low frequencies; (2) peak pressure is affected only when the inertia load factor is high and then only in the midfrequency range; (3) choice of the orifice does not affect the cavitation performance; (4) a circular orifice provides a more stable system than a rectangular orifice; and (5) a rectangular orifice gives a much better small amplitude response. (USBR)
W73-11723

A SURVEY OF LARGE PERMANENT UNDERGROUND OPENINGS IN NORWAY,
Norges Tekniske Hoegskole, Trondheim.
For primary bibliographic entry see Field 08E.
W73-11724

THE REVIN PUMPED-STORAGE PLANT,
Electricite de France, Paris.
P. R. Gerard.
Water Power, Vol 24, No 11, p 411-418, Nov 1972. 7 fig, 4 photo.

Descriptors: *Pumped storage, *Underground powerplants, *Peak power, Reversible turbines, Pump turbines, Reservoirs, Earth dams, Tunnels, Penstocks, Construction costs, Construction materials, Foreign projects, Tunnel linings, Hydraulic machinery, Geology.
Identifiers: *Hydroelectric powerplants, France, Spherical valves, Electric machinery, Peaking capacities, Intake structures, Foreign construction.

The Revin plant, a 760-mw pumped storage plant being built in the Ardennes in France to furnish 180-km daily peaking power to Paris, is described. This plant, when completed, will be the third largest pumped storage plant in the Belgium-Luxembourg-France area. The project is comprised of a hilltop upper basin having an area of 700,000 sq m; a lower reservoir formed by an earthfill dam across the Faux River; and an underground powerplant, housing four 190-mw, 0.9-pf, single-stage reversible-pump turbine units, each with a spherical valve in its penstock. The units have a vertical shaft arrangement designed to operate over a net head ranging from 212 to 250 m at 300 rpm. The upper reservoir provides storage for 5 hrs of generation at full capacity, and will require 7-1/2 hrs in the pumping mode to refill. To start the units in the pumping mode, a conventional pony motor and compressed air dewatering will be used on 3 units with the fourth unit being started as an asynchronous motor at full voltage. Full-scale construction on the project began in 1970; the firts unit to be in service by the end of 1973, and the remaining 3 by the end of 1974. (USBR)
W73-11726

THE DYNAMICS AND CONTROL OF EULERIAN TURBOMACHINES,
Massachusetts Inst. of Tech., Cambridge.
H. M. Paynter.
Paper 72-Aut-S, Trans Am Soc Mech Eng, Ser G--J Dyn Syst Meas Control, May 1972. 8p, 13 fig, 1 tab, 11 ref.

Descriptors: *Hydraulic machinery, *Hydraulic turbines, *Fluid mechanics, *Control, Pumps, Dynamics, Energy conversion, Pump turbines, Governors, Pulsating flow, Model studies, Reynolds number, Turbine blades, Mechanical control.
Identifiers: *Fluid dynamics, Eulers Equation of Motion, Transients, Wicket gates, Transducers.

An efficient turbomachine (fan, blower, compressor, pump, propeller, or turbine) represents an energy converter or transducer basically gyrational in character. A 2-port gyrator operating in conjunction with a 2-port dissipator can represent the static characteristics of any real machine. This model is further simplified if the machine satisfies Eulerian similitude. If an Eulerian turbomachine is controlled or modulated by movable guidevanes or wicket gates, the necessary fluid-dynamical reaction forces on the gates are constrained by energy couplings directly related to the energy conversion process through the machine. A systematic approach given demonstrates the underlying theory of Eulerian turbomachines and yields rational structured bond graph models useful in dynamics and control studies. These models also provide effective design and operating information for major engineering systems. (USBR)
W73-11731

SHIELD TUNNELLING WITH LINER PLATES,
Wayss und Freytag KG, Frankfurt-am-Main (West Germany).
For primary bibliographic entry see Field 08A.
W73-11732

AN UNDERGROUND STORAGE RESERVOIR AS AN ARTIFICIAL STRUCTURE,
Energoprojekt, Belgrade (Yugoslavia).
For primary bibliographic entry see Field 08A.
W73-11741

OPTIMAL GATE CLOSURE SCHEDULE FOR HYDROELECTRIC TURBINE SYSTEM,
Illinois Univ., Urbana.
L. Wozniak, and G. H. Fett.
Paper No 72-WA/Fe-23, Trans Am Soc Mech Eng, Ser D--J Basic Eng, Winter Annual Meeting, New York, NY, Nov 1972. 6 p, 5 fig, 16 ref, 2 append.

Descriptors: *Water hammer, Electric power, *Hydraulic turbines, *Governors, *Optimization, Gate control, Penstocks, Computers, Hydraulic machinery, Bibliographies, Hydroelectric powerplants, *Gates, Computer programs, Transient flow.
Identifiers: Overspeed, *Wicket gates, *Closures.

With the National demand for electric energy predicted to double every 10 yrs and with the development of interconnected networks, the requirements in system design for quality of transient behavior have become increasingly more stringent. Advances in computer technology within the last decade have made possible comprehensive simulations on a non-linear basis. A procedure is presented for the generation of an optimal gate closure schedule for the case of full load rejection on an isolated hydroelectric system. Constraints are placed on turbine overspeed and penstock overpressure. The optimization is performed on the basis of minimum integral square of the speed error and implemented digitally by the method of steepest descent. The computation indicates that a substantial performance improvement is achieved with optimal control as opposed to the conventional. The index of performance has a relative value of 1.58 for the optimal strategy. The best solution for the conventional speed governed case was 2.20. (USBR)
W73-11742

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF MAINE YANKEE ATOMIC POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11899

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF ZION NUCLEAR POWER STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11900

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SURRY POWER STATION UNIT 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11903

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF KEWAUNEE NUCLEAR POWER PLANT.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11904

REPORT ON RELEASES OF RADIOACTIVITY IN EFFLUENTS FROM NUCLEAR POWER PLANTS FOR 1971.
Directorate of Regulatory Operations (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-11905

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF FORT CALHOUN STATION UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11906

SOME FEATURES OF THE IMPACT OF A FUSION REACTOR POWER PLANT ON THE ENVIRONMENT,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 05B.
W73-11910

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE ARKANSAS NUCLEAR ONE UNIT 1.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11913

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED HANFORD NUMBER TWO NUCLEAR POWER PLANT.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11917

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF DAVIS-BESSE NUCLEAR POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11920

ENVIRONMENTAL SURVEILLANCE AT HANFORD FOR CY-1972,
Battelle-Pacific Northwest Labs. Richland, Wash.
For primary bibliographic entry see Field 05A.
W73-11924

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF SHEARON HARRIS NUCLEAR POWER PLANT UNITS 1, 2, 3, AND 4.
Directorate of Licensing, (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11926

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CRYSTAL RIVER UNIT 3.
Atomic Energy Commission, Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11927

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF PILGRIM NUCLEAR POWER STATION.
Division of Radiological and Environmental Protection (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11928

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF JOSEPH M. FARLEY NUCLEAR PLANT UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11931

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF VERMONT YANKEE NUCLEAR POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11932

8D. Soil Mechanics

BEARING CAPACITY THEORY FROM EXPERIMENTAL RESULTS,
Indian Inst. of Tech., Kharagpur.
A. V. Chummar.
J Soil Mech Found Div, Am Soc Civ Eng, Vol 98, No SM12, p 1311-1324, Dec 1972. 9 fig, 1 tab, 12 ref, 2 append.

Descriptors: *Foundations, Laboratory tests, Cohesionless soils, Soil mechanics, Foundation bearing tests, Structural stability, Foundation failure, Shear strength, Theoretical analysis, Strain, Failure (Mechanics), Model studies.
Identifiers: *Bearing capacity, Continuous footings, Plane strain, Footings, Mathematical analysis, Comparative studies, Bearing values, Failure surfaces.

A theory of bearing capacity of strip footings on cohesionless soils is developed, based on a failure surface deduced from experimentally observed surfaces. Conclusions are: (1) Existing theories on bearing capacity are based on failure surfaces, whose size and shape are different from those observed in experiments. In dense sands the observed surfaces are much smaller than those assumed in theories. (2) For long footings where plane-strain conditions prevail, commonly used theories fail to accurately predict bearing capacity. (3) Bearing capacity equations based on a failure surface deduced from the experimentally observed surfaces predict the bearing capacity of long footings accurately when the plane-strain value of the friction angle is taken as 1.1 times the triaxial test value. (4) The failure surface deduced from experimentally observed surfaces is different from those assumed in existing theories. The deduced surface comprises circular and plane surfaces, the plane surface making an angle close to 45 deg with the horizontal. Equations for calculating bearing capacity are presented. (USBR)
W73-11718

BASIC RELATIONSHIPS AFFECTING THE PLANNING OF SINGLE-PHASE CHEMICAL GROUND STABILIZATION,
For primary bibliographic entry see Field 08G.
W73-11729

CENTRIFUGE TESTING FOR MODELS OF SOIL STRUCTURES,
Canterbury Univ., Christchurch (New Zealand).
T. A. H. Dodd.
N Z Eng, Vol 27, No 9, p 286-290, Sept 15 1972. 1 fig, 1 photo, 7 ref.

Descriptors: Soil tests, *Centrifugation, Soil mechanics, Laboratory equipment, Earth dams, Pore pressure, Slope stability, Embankments, Consolidation, Tunnels, Model studies.
Identifiers: Japan, Great Britain, Centrifuges, Bearing capacity, *Similitude.

Substantial savings are expected in the cost of designing dams and other earth structures by using centrifuge models rather than conventional laboratory strength and consolidation soil tests. Centrifuge models are based on 2 laws of similarity for soil models: (1) If a gravity-affected soil prototype is modeled in identical soil to a scale of 1/N and this model is subjected to gravitational force of N times that experienced by the prototype, then, provided that the stresses at the boundaries of the model and the prototype are also to scale, the model will behave, to scale, exactly the same as the prototype. (2) Provided the above boundary conditions are satisfied, than any time dependence in the response of the prototype to the applied stress is speeded up in the model by a factor of N squared, provided secondary consolidation can be ignored. Of the centrifuge machines built in Britain and Japan, the largest is capable of accelerating to 200 g; model size range up to 0.6 m high and 1.2 by 2.0 m in plan. Tests performed include: (1) earth dam stability under drawdown, (2) tunnel section deformation, (3) embankment settlement, (4) foundation bearing capacity, and (5) slope stability. (USBR)
W73-11745

BREVARD COUNTY BEACH EROSION CONTROL PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08A.
W73-11997

8E. Rock Mechanics and Geology

A SURVEY OF LARGE PERMANENT UNDERGROUND OPENINGS IN NORWAY,
Norges Tekniske Hoegskole, Trondheim.
T. L. Brekke.
Paper, Int Symp Large Perm Underground Openings, Oslo, Norway, Sep 1969, p 15-28, 1970. 11 fig, 29 ref.

Descriptors: *Underground powerplants, Geologic investigations, *Underground structures, *Engineering geology, Rock excavation, Rock mechanics, Geology, Rock tests, Education, Rock properties, Expansive clays, Bibliographies, Costs.
Identifiers: *Underground openings, *Tunnel supports, Norway, Hydroelectric powerplants, Unlined tunnels, Foreign construction, Rock pressure.

Construction of underground structures in Norway has been encouraged by favorable natural conditions--generally no more than 5% of a Norwegian underground project is lined or systematically reinforced. The most important underground structures are 110 hydropowerplants. These plants, some with pressure heads of over 1,000 m, provide 75% of the country's electric power. Underground plants were found to be more economical than those in the open, leading to better utilization of available heads, greater flexibility in site choice, shorter pipelines, simplified construction details, year-round construction, and reduced maintenance and repair costs. Low excavation costs, mainly using percussive drilling, greatly influence the economy. Laboratory tests were developed to predict rock indexes for percussive drilling rate, bit wear, and blasting resistance. Important factors causing underground stability problems are: (1) unfavorable directions and combinations of faults, joints, and fissures; (2) rock pressure; and (3) swelling montmorillonite clay. For site investigations, less core drilling is done in Norway than elsewhere. Savings have been realized because the parties involved are willing to reconsider the site, orientation, and design during the construction period. (USBR)
W73-11724

COUPLED STRESS AND FLOW ANALYSIS OF FRACTURED DAM FOUNDATIONS AND ROCK SLOPES,
California Univ., Berkeley.
T. L. Brekke.
Paper, Symp Int Soc Rock Mech: Percolation Through Fissured Rock, Stuttgart, Germany, Sept 1972. 8 p, 12 fig, 3 tab, 11 ref.

Descriptors: *Dam foundations, *Rock foundations, *Seepage, Fractures (Geology), Stress analysis, Finite element method, Joints (Geologic), Uplift pressure, Grouting, Flow nets, Grout curtains, Phreatic lines, Seepage control, Rock mechanics, Water pressure, Fluid flow.
Identifiers: *Rock foundations, Rock slope, Fluid force, Mathematical analysis, Toe drains, Underground openings.

An analytical method is presented that considers the interaction between flow forces, body forces, and boundary loads in fractured rock masses. Although some methods mathematically model a fractured rock mass as a continuum or a rigid discontinuum, the model for this method is a deformable discontinuum whose fractures can change size depending on the stress conditions. In studying the foundation for a gravity dam, 2 finite element techniques and a converging iteration process are used. Steps to be followed are: (1) determine the effect of the structure on the rock mass stress distribution and fracture openings; (2) determine approximate fluid pressures using fracture openings calculated in step (1); (3) determine new fracture openings considering effect of structure and fluid pressures calculated in step (2); (4) recalculate fluid pressure using fracture openings determined in step (3); and (5) iteration of steps (3) and (4) until the changes in fluid pressure are satisfactorily small. Examples using this coupled stress-flow procedure are presented for a gravity dam with 3 different foundation conditions: untreated, grouted, and drained. Results using this method are simetimes considerably different than results using a rigid discontinuum. (USBR)
W73-11730

8F. Concrete

CONTROL OF CRACKING IN CONCRETE STRUCTURES,
American Concrete Inst., Detroit, Mich. Committee 224.

Journal of the American Concrete Institute, Proceedings, Vol 69, No 12, p 717-753, Dec 1972. 20 fig, 5 tab, 94 ref, append.

Descriptors: *Concretes, *Concrete technology, Concrete construction, Structural design, Concrete structures, Concrete control, Reinforced concrete, Prestressed concrete, Creep, Mass concrete, Strain, Stress, Cracks, Shrinkage, Aggregates, Expansion, Bibliographies, Criteria, Slabs.
Identifiers: *Crack control, *Cracking, Microcracks, Concrete properties, Heat of hydration, Volume change, Criteria.

With the widespread use of high-strength steels and the trend toward ultimate load and limit theory designs, control of cracking in reinforced concrete structures becomes very important. To help engineers exercise better judgment in designing crack-controlled structures, a comprehensive report on the principal causes of cracking and recommended crack control provisions is presented. The basic mechanism of microcracking and fracture mechanics in concrete is explained. Presented are quantitative recommendations for control of cracking due to drying shrinkage, control of flexural cracking, and crack control in prestressed concrete. Effects of long-term loading and exposure are described. Specific recommendations for control of cracks in mass concrete include details of an embedded pipe cooling system. Control of construction practices which cause or facilitate cracking are discussed. (USBR)
W73-11728

DEFLECTIONS OF PRESTRESSED CONCRETE BRIDGES IN JAPAN,
Tokyo Univ. (Japan).
M. Kokubu.
Mag Concr Res, Vol 24, No 80, p 117-126, September 1972. 10 fig, 3 tab, 12 ref.

Descriptors: *Deflection, *Bridge design, Prestressed concrete, Concrete structures, Structural behavior, Cantilevers, Structural analysis, Measurement, Strain, Creep, Shrinkage, Seismic design, Structural design, Earthquake engineering, Concrete mixes.
Identifiers: *Highway bridges, *Railroad bridges, Carlson strain meter, Foreign design practices.

Deflections measured in 5 prestressed concrete bridges in Japan are summarized and discussed. The bridges are long span, hinged at the center, and constructed by the cantilever method. Measured values were compared with values calculated by a simplified deflection formula after the hinges were joined. Despite many factors that could be considered when calculating bridge deflections, fairly good agreement with measured values was obtained by assuming a drying shrinkage strain in concrete of 0.000150 and a creep coefficient of 2.0 over the entire length of the beam. Deflections that may be expected when bridges of the continous type are subjected to seismic forces and designs to cope with these conditions are discussed. To confirm the degree of safety of important bridges, dynamic analyses were made. Natural frequencies determined from vibration tests did not differ greatly from calculated values. A practical method to dampen horizontal seismic forces at each pier using steel dowels is described. (USBR)
W73-11735

CONDITIONS FOR INSTABILITY IN RESTRAINED CONCRETE PANELS EXPOSED TO FIRE,
London Univ. (England).
J. W. Dougill.
Mag Concr Res, Vol 24, No 80, p 139-148, Sept 1972. 1 tab, 11 ref.

Descriptors: *Concrete technology, *Spalling, *Thermal stress, Concretes, Stress, Strain, Heat, Pore pressure, Tensile stress, Numerical analysis, Walls, Computer models, Failure, Concrete structures, Temperature.
Identifiers: *High temperature, *Spalling, *Thermal spalling, Fire safety, Compressive stress, Stress-strain curves, Panels, Cracking, Fires, Calculations.

Instabilities associated with general spalling of plain concrete panels were investigated to obtain a thermal history similar to that obtained in a standard fire test. Results illustrate the effects of flexural restraint and loading of the panels upon the occurrence of general spalling. These effects are important in assessing the performance of structures exposed to fire. Behavior of a heated panel was influenced by the extent of cracking caused by tensile stress, and by the steepness of the descending branch of the stress-strain curve in compression. The first of these effects may have important implications because using large quantities of reinforcing steel in heated panels may transform progressive compression failure, controlled by cracking, to a violent one. The second effect is more difficult to assess, but strain softening may become more serious because of a modest amount of pore pressure in the concrete. Production of steam in the concrete at high temperatures could increase general spalling. (USBR)
W73-11739

THE HENDRIK VERWOERD DAM OF THE ORANGE RIVER PROJECT, SOUTH AFRICA.
South African Embassy, London (England).
For primary bibliographic entry see Field 08A.
W73-11740

METHODS FOR SAMPLING AND DETERMINING SIEVE ANALYSIS OF AGGREGATES LARGER THAN ONE AND ONE-HALF INCH SIEVE,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. L. Curry, R. E. Philleo, and B. Mather.
Available from NTIS, Springfield 22151 as AD-751 104. Price $3.00 printed copy; $1.45 microfiche. Technical Report No 6-543, May 1960. 30 p, 1 fig, 5 tab, 8 ref.

Descriptors: *Sieve analysis, *Aggregates, *Particle size, *Coarse aggregates, Separation techniques, Correlation analysis, Evaluation, Hydraulic structures, Concrete technology, Construction materials, Engineering structures.

Sampling of concrete aggregates larger than the 1-1/2 inch sieve poses special problems due to difficulties encountered in handling and shoveling crushed stone and gravel of large maximum size and the large amount of material required per sample. Methods of sampling tested were grab sampling with a clamshell from the stockpile, trench sampling from trucks loaded with the aggregate, belt sampling while aggregate was being loaded into a storage bin, and grab sampling of materials being discharged from bin storage. Comparative sieve analyses were made of samples of both 1-1/2- to 3- inch and 3- to 6-inch size ranges. The general conclusions were that any of the sampling methods would be satisfactory; that 100-lb samples of 1-1/2 to 2-inch aggregate and 300-lb samples of 3-to 6-inch aggregate would be large enough; that diameter of wire in the 5- and 6-inch sieves should be approximately 0.360 to 0.530 inch, and that hand-sieving of aggregates coarser than the 3-inch sieve may be satisfactorily accomplished. (Woodard-USGS)
W73-12070

8G. Materials

BEARING CAPACITY THEORY FROM EXPERIMENTAL RESULTS,
Indian Inst. of Tech., Kharagpur.
For primary bibliographic entry see Field 08D.
W73-11718

SONIC CAVITATION STUDIES ON MODEL AND PROTOTYPE WATER TURBINES,
Hydro-Electric Commission, Tasmania.
For primary bibliographic entry see Field 08C.
W73-11720

PROCEDURES FOR EVALUATION OF FRACTURE TOUGHNESS OF HEAT-AFFECTED ZONES,
Lafayette Coll., Easton, Pa.
L. J. McGeady.
Weld J, Vol 51, No 12, p 569-s-578-s, Dec 1972. 12 fig, 7 tab, 11 ref.

Descriptors: *Welding, Mechanical engineering, Fabriaction, Failure (Mechanics), Yield strength, Mechanical properties, Strength of materials, Ductility, Steel plates.
Identifiers: *Weldments, *Toughness, *Fractures, *Metal test, Fracture mechanics, Cracking, Critical depth, Tensile properties, Welds, Material test.

A good quality weld requires adequate fracture toughness of base metal, weld metal, and heat-affected zone (HAZ). Inadequate toughness in any area is a threat to structural integrity. Reliable methods of evaluating fracture toughness in the base metal or the weld metal are available, but HAZ toughness evaluation has posed experimental problems and are discussed in this paper. The Drop-Weight (DW) and Dynamic Tear (DT) tests have been widely used to characterize plate and weld metal toughness separately and quantitatively. Data presented demonstrate that these 2 procedures can be applied to HAZ toughness. Results of composite specimen tests and single component tests agree well when applied to several steels. Successful characterization of HAZ toughness using the DW and DT procedures provides quantitative reference data for use in the Fracture Analysis and Ratio Analysis Diagrams. Information from practical test methods is necessary in defining appropriate welding parameters for specific steels. (USBR)
W73-11721

MECHANISMS OF ENERGY ABSORPTION IN SPEICAL DEVISES FOR USE IN EARTHQUAKE RESISTANT STRUCTURES,
California Univ., Berkeley.
For primary bibliographic entry see Field 08A.
W73-11725

BASIC RELATIONSHIPS AFFECTING THE PLANNING OF SINGLE-PHASE CHEMICAL GROUND STABILIZATION,
G. Greschik.
Symp Prot Underground Build Against Water, Bratislava, Czechoslovakia, p 97-104, Sept 1972. Transl from German, Bur Reclam Transl 884, Dec 1972. 11 p, 7 fig.

Descriptors: *Soil stabilization, Chemical properties, Stabilization, Grouting, Costs, Optimization, Gels, Viscosity, Chemical engineering, Soil mechanics, Chemistry, Strength.
Identifiers: *Chemical grouts, *Sodium silicate, Grout mixes, Chemical compounds, Grouting pressure, Setting (Materials).

Stabilizing ground chemically involves an optimization of both the chemical injection process and the chemical mixture composition. The 2 optimization tasks are linked by the viscosity and setting time of the chemical mixture. The chemical injection process can be solved, after evaluating the ground conditions, with the aid of Maag's or Haefeli's equations, but determining the optimum chemical mixture is usually more difficult. Principal properties of an injection material or gel are the viscosity, setting time, strength, and cost. The chemical components of the injection mixture tested, whose quantity and temperature determine the properties of the mixture, are sodium silicate, a precipitant, and water. Triangular diagrams are presented giving the setting time, initial viscosity, strength, and cost for mixtures with all possible percentages of sodium silicate, precipant, and water. Using the maximum initial viscosity and minimum setting time values calculated for the chemical injection process, the triangular diagrams can be used to determine a chemical mixture with satisfactory strength and economy. (USBR)
W73-11729

APPLICATION OF CATHODIC PROTECTION,
Texas Eastern Transmission Corp., Shreveport, La.
D. A. Tefankjian.
Mater Prot Performance, Vol 11, No 11, p 50-60, November 1972. 5 fig, 4 tab.

Descriptors: *Cathodic protection, *Corrosion control, *Corrosion, Pipelines, Cathodes, Anodes, Electrolysis, Rectifiers, Protective coatings.
Identifiers: *Buried pipes, *Buried structures, Galvanic protection systems, Buried metalwork, Ground currents, Corrosion currents, Electric potential, Galvanic corrosion, Soil resistivity, Underground corrosion, Protection (Electrical).

As the number of underground structures increases, corrosion becomes more as a problem. The rising cost of repairs and replacements for these structures necessitates an increasing demand for corrosion protection methods. Corrosion control practices, such as the application of cathodic protection and protective coatings, and improved metallurgical techniques are becoming more important. The principles involved, the methods used, and design factors for applying cathodic protection are discussed. Cathodic protection consists of making the potential of the soil contacting the buried structure positive so corrosion currents can no longer leave the metal surface. The higher intensity protective currents enter the structure and are drained away by a metallic circuit at a controlled point. If electric currents are kept from leaving the buried structure electrolytically, corrosion is arrested. (USBR)
W73-11736

RESPONSIBLE WELD DESIGN,
Lincoln Electric Co., Inc., Cleveland, Ohio.
O. W. Blodgett.
Weld J, Vol 52, No 1, p 13-21, Jan 1973. 20 fig, 1 tab.

Descriptors: *Welded joints, *Welding, Design, Fabrication, Costs, Stress, Joints (Connections), Steel structures.
Identifiers: *Weldments, Butt welds, *Welds, Butt joints, Fillet welds.

Perhaps in no other field is responsible performance more important to the end product than in weldment design. An expert weldment designer can design welds that will meet all service requirements and yet be lacking in responsible performance because of excessive production costs. A weldment designer is not doing a responsible job unless the design is economical, practicable in production, and workable in service. The experienced, responsible weldment design engineer must know--how welds will be produced, how material will be cut, and how assemblies will be put together. He should have a casual acquaintance with every operation in production. To promote best use of welding the designer minimizes the amount of weld metal to be deposited--thereby proving welding as a method of joining that maintains the full strength of the materials. Twelve shortcomings that produce irresponsible design are discussed. (USBR)
W73-11743

CENTRIFUGE TESTING FOR MODELS OF SOIL STRUCTURES,
Canterbury Univ., Christchurch (New Zealand).
For primary bibliographic entry see Field 08D.
W73-11745

SCALE INHIBITION BY ORGANIC ELECTRODEPOSITION,
Tyco Labs, Inc., Waltham, Mass.
L. Nelsen, and A. H. Taylor.
Available from the National Technical Information Service as PB-218 833, $3.00 in paper copy, $1.45 in microfiche. Office of Saline Water, Research and Development Progress Reports No 835, August 1972. 62 p, 11 fig, 12 tab. 14-30-2856.

Descriptors: *Scaling, *Heat exchangers, Inhibition, Evaporators, Crystallization, Calcium sulfate.
Identifiers: Ultra-thin layers, Organic electrodeposition.

A research program to inhibit the formation of calcium sulfate anhydrate scale on heat exchangers of evaporative desalination plants was carried out. In this study ultra-thin layers of organic materials were deposited on heated metallic surfaces by means of controlled electrical potentials. The organics studied included polymers and low molecular weight organic compounds. Both types of coatings resulted in significant reduction in scale. The studies suggest that the deposited layers provided a passivation of the surface preventing scale nucleation. (OSW)
W73-11751

8H. Rapid Excavation

NEW CONTINUOUS-FLOW PROCESS FOR BLAST-HOLE DRILLING IN HYDRAULIC-ENGINEERING, RECLAMATION, AND WATER--RESOURCES CONSTRUCTION,
Severyni Nauchno-Issledoatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
D. M. Drushnarev, and A. N. Patrashev.
Cent Lab Reclam Hydraul-Eng Blasting. Res North Sci-Res Inst Hydraul Eng Reclam, 10 p, Moscow, 1971. Transl from Russ, Bur Reclam Transl 880, Nov 1972. 9 p, 7 fig.

Descriptors: *Canals, *Explosives, *Explosive construction, *Cold weather construction, Frozen soils, Pipes, Plastic pipes, Boreholes, Polyethylene, Foreign construction, Foreign tests.
Identifiers: *Cylindrical charges, *Explosive excavation, *Explosive construction, *Rapid excavation, *Construction methods, Depth of burst, Charges (Explosives), Blasting, Fuses (Explosions), Foreign activities.

Because canal excavation by the conventional explosive method is not uniform, a new method of using a continuous horizontal explosive charge has been developed. In soft soils, 250 to 300 m of flexible polyethylene, high-pressure pipe filled with granular explosive is place automatically at a predetermined depth by a special tractor. Before the explosive is detonated, the buried charge is compacted. A narrow trench, 30 to 40 cm deep, is cut on both sides of the centerline at the design width of the canal. The resulting canal created by a single explosion is fairly uniform. In forzen soil, a narrow trench is excavated and a continuous charge placed simultaneously at the bottom of the trench, enabling the soil to be excavated 10 times faster than by conventional earthmoving machines. Other advantages of this method are: (1) Fewer fuses and detonators are required; (2) only 1/3 the usual amount of explosive charge is required; and (3) earthwork productivity is 400% higher. A curve is included showing the depth and amount of charge required to excavate canals with different cross sections. (USBR)
W73-11733

8I. Fisheries Engineering

INTRODUCTION OF KOKANEE SALMON (ONCORHYNCHUSNERKA) INTO LAKE HURON,
Department of Lands and Forests, South Baymouth (Ontario). Research Branch.
J. J. Collins.
J Fish Res Board Can. Vol 28, No 12, p 1857-1871. 1972. Illus.
Identifiers: Alewife, Canada, DDT, Food, Insects, *Kokanee salmon, Lakes, Oncorhynchus-Nerka, Plankton, Salmon, Spawning, *Lake Huron.

An experimental introduction of O. nerka into Lake Huron from egg stocks obtained from British Columbia and several western USA states began in 1964. From 1964-1969, about 5.5 million kokanee (eggs, fry, and fingerlings) were planted. Estimated minimum returns of adults were 9000, 1200, and 4000 in 1967, 1968, and 1969, respectively. Although most of the returns were recorded near planting sites, substantial numbers moved into other areas, in some instances spawning in streams that were not planted. Apparently, most kokanee matured in their third yr of life (2+) and their lengths ranged from 18-49 cm. The incidence of lamprey marks on adults was light (1.6% of 4472 examined) but frequencies of marks tended to increase as fish size increased -- from 0.5% for 28-32 cm fish to 16.7% for fish over 40 cm long. Successful stream spawning in 1967 was indicated by the retrieval of live eggs and alevins from redds and the capture of downstream migrant fry. Shore spawning was verified by retrieval of viable eggs from redds in 1969. The potential egg deposition in the 2 rivers with the largest runs in 1967 was approximately 2.7 million eggs. Fish from British Columbia river-spawning stock spawned both in streams and along shores of South Bay. Since spawning was not restricted to streams, the shore areas of Lake Huron may extend the spawning habitat available to kokanee. Adult kokanee fed mainly on insects and plankton during Aug. and Sept. Aerial forms of insects predominated in South Bay kokanee. Dieldrin and DDT residues were moderate, averaging between 0.012 and 0.046 ppm for dieldrin and 0.226 and 1.242 ppm for DDT in whole tissue samples. Data from South Bay show that the principal species found in association with kokanee were alewife and smelt. The diet

of alewife in Aug. indicated possible competition with kokanee.h-Copyright 1972, Biological Abstracts, Inc.
W73-11717

OBSERVATIONS ON THE MIGRATION OF SOCKEYE SALMON FRY (ONCORHYNCHUS NERKA) IN THE LOWER BABINE RIVER,
California Univ., Berkeley. Dept. of Zoology.
W. C. Clarke, and H. D. Smith.
J Fish Res Board Can. Vol 29, No 2 p 151-159. 1972. Illus.
Identifiers: *Babine River, *Canada, Fry, Fish migration, Oncorhynchus-Nerka, Rivers, Salmon, *Sockeye salmon fry.

No distinct length, weight, or behavioral differences associated with place of capture in the river were observed, indicating that all fry are susceptible to downstream displacement. A minimum of 7.5 million (18%) of the fry produced passed through a counting fence below the spawning grounds. Others reached quiet waters inshore, where they progressively developed behavioral characteristics that enabled them to ascend the river and reach lake nursery areas above. Two million fry ascended an improvised ladder spanning an area of turbulence at the base of the fence. Construction of leads and baffles at stretagic places below the fence could help fry reach shore sooner and increase numbers reaching the lake.--Copyright 1972, Biological Abstracts, Inc.
W73-11747

FERTILIZATION OF PINK SALMON (ONCORHYNCHUS GORBUSCHA) OVA BY SPERMATOZOA FROM GONADOTROPIN- INJECTED JUVENILES,
Fisheries Research Board of Canada, West Vancouver (British Columbia). Vancouver Lab.
E. M. Donaldson, J. D. Funk, F. C. Withler, and R. B. Morley.
J Fish Res Board Can. Vol 29, No 1, p 13-18. 1972. Illus.
Identifiers: Fertilization (Fish), *Gonadotropin spermatozoa, Hormone-Drug, Juveniles, Oncorhynchus-gorbuscha, Oncorhynchus-Tshawytscha, *Pink salmon ova, *Sexual maturation, *Canada (British Columbia).

Sexual maturation in male O. gorbuscha from Jones Creek, a tributary of the Fraser River, British Columbia, was accelerated by ia-traperitoneal injections of partially purified chinook salmon (O. tshawytscha) gonadotropin. The treated pinks produced milt 1 yr earlier than normal. Milt from these fish was compared with milt from wild lower Babine River pinks with respect to its ability to fertilize the ova of Lower Babine River females. There was no marked differences in proportions of ova fertilized, in survival to hatching, or in numbers of deformed larvae. Densities of sperm in the milt from treated males ranged from 0.15 x 10 to the 9th power to 7.35 x 10 to the 9th power/ml; sperm densities in the milt from wild males ranged from 19.3 x 10 to the 9th power to 38.6 x 10 to the 9th power/ml. Two stages in testicular development were identified among the treated males and found to be directly related to the success of fertilization. The significance of induced early maturation in attempts to establish pink runs in the 'off' year rivers is discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-11866

GROWTH PER MOULT OF TAGGED LOBSTERS (HOMARUS AMERICANUS) IN BONAVISTA BAY, NEWFOUNDLAND,
Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station.
G. P. Ennis.
J Fish Res Board Can, Vol 29, No 2, p 143-148, 1972, Illus.
Identifiers: Bays, *Bonavista Bay (NF), *Canada (Newfoundland), Growth, Homarus-americanus, *Lobsters, Molt, Tagging.

The suitability of the sphyrion tag for lobster growth studies is demonstrated by comparing growth of ferromagnetic- and sphyrion-tagged lobsters. Carapace length and total weight increments in one molt of 54 males (52-92-mm carapace length) tagged with sphyrion tags averaged 11.4 mm (15.7%) and 185.9 g (60.8%). For 56 females 57-89-mm carapace length they averaged 9.8 mm (13.3%) and 136.3 g (42.5%). Differences in growth per molt between sexes increased with size. For both sexes percent carapace length increment decreased with increase in carapace length but more rapidly for females. Carapace length increment increased with increasing carapace length for males, but for females there was no significant change over the size range considered. Incidence of molting for sphyrion-tagged lobsters was 83.1% and comparable with an observed estimate (82.2%) from field samples obtained shortly after the molting season.--Copyright 1972, Biological Abstracts, Inc.
W73-11914

RECOVERY OF PLANTED BROOK TROUT, SPLAKE, AND RAINBOW TROUT FROM SELECTED ONTARIO LAKES,
Department of Lands and Forests, Maple (Ontario). Research Branch.
J. M. Fraser.
J Fish Res Board Can. Vol 29, No 2, p 129-142. 1972. Illus.
Identifiers: Birds, *Brook trout, Canada (Ontario), Lakes, Predation, *Rainbow trout, Recovery, Salmo-Gairdneri, Salvelinus-Fontinalis, Salvelinus-Namaycush, *Splake, Trout.

Recoveries of hatchery-reared brook trout (Salvelinus fontinalis), splake (Salvelinus namaycush X S. fontinalis), and rainbow trout (Salmo gairdneri), planted in lakes having different resident fishes, were highest (9-30%) in a lake in which minnows and the brook stickleback were the only other fishes. Recoveries, by angling and gill-netting, were considerably lower (2-15%) in 2 lakes containing the white sucker and minnows, and still lower (0.5-5%) in 2 lakes containing spiny-rayed species as well. Recoveries were lowest (<0.5%) in a lake having a complex fish community that included native brook and lake trout. Planted splake and rainbow trout generally yielded higher returns, in weight, than brook trout in comparable situations. The low survival of planted fish was apparently due to the low fertility of the waters and to competition with, or predation by, resident fish species. Predation by fish-eating birds and mammals may also have had an effect. The weight of the catch of salmonids exceeded the weight planted in only 1 lake. Here, the mean yield of planted salmonids was 8.4 kg/ha/hr in comparison with 2.6 to <0.5 kg/ha/yr in the 5 other study lakes.--Copyright 1972, Biological Abstracts, Inc.
W73-11940

A SYNOPTIC STUDY OF FOOD HABITS OF 30 FISH SPECIES FROM WESTERN LAKE SUPERIOR,
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
For primary bibliographic entry see Field 02H.
W73-11959

COASTAL PLAINS REGIONAL COMMISSION--ANNUAL REPORT, 1972.
For primary bibliographic entry see Field 06E.
W73-11974

FERTILIZATION OF STEELHEAD TROUT (SALMO GAIRDNERI) EGGS WITH CRYO--PRESERVED SPERM,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
A. G. Ott, and H. F. Horton.
J Fish Res Board Can. Vol 28, No 12, p 1915-1918. 1972.
Identifiers: *Fertilization (Trout), Salmo-Gairdneri, *Trout sperm (Cryo-perserved), *Steelhead trout, Fish eggs.

The average percent fertilization of fresh S. gairdneri ova inseminated with cryo-preserved sperm was 59 in 90 tests. Sodium bicarbonate, lecithin, and mannitol at 750, 750, and 250 mg/100 ml, respectively, were included in the extender. The most effective concentration of dimethyl sulfoxide in the extender was 12% (v/v). Significant differences in percent of fresh ova fertilized with cryo-preserved sperm were attributed to both parents.--Copyright 1972, Biological Abstracts, Inc.
W73-12129

STUDIES ON CARP CULTURE IN RUNNING WATER POND: IV. ON RELATION BETWEEN DIURNAL CHANGE OF WATER QUALITIES IN THE FISH POND AND DECREASE OF FISH FEEDING (IN JAPANESE),
Freshwater Fisheries Research Lab., Toyko (Japan).
K. Chiba.
Bull Freshwater Fish Res Lab Tokyo. Vol 21, No 1, p 59-68. 1971. Illus. English summary.
Identifiers: *Carp, Culture, Diurnal, Feeding, Fish (Feeding), *Oxygen, Ponds, Running water.

O2 concentration lowered below 50% air saturation was the principal factor of decreased feeding of fish in the running water fishpond. (See also W72-07700)--Copyright 1972, Biological Abstracts, Inc.
W73-12174

HATCHERY REARING OF WALLEYES USING ARTIFICIAL FOOD,
Department of Lands and Forests, Tweed (Ontario).
W. F. Chesire, and K. L. Steele.
Prog Fish-Cult Vol 34, No 2, p 96-99. 1972. Illus.
Identifiers: *Fish diets, Artificial food, Granules, *Hatchery rearing, Trout, *Walleyes.

Walleye were pond reared experimentally at the White Lake Rearing Station in Ontario since 1961. Tests were started in 1965 to determine whether young walleye would feed on an artificial diet, and thus reduce the problem of cannibalism in the ponds. Since 1969, all walleye reared were trained to feed on trout granules. The method consists of first incubating walleye eggs in standard hatchery jars until the fry hatch. The fry are then transferred to fertilized pond where the fish are reared to about 50 mm in length. At this stage they are transferred to troughs and raceways where they are trained to feed on trout granules. Young walleye are currently trough reared until they reach about 100 mm. Compared to pond rearing walleye to 100 mm, survival to this size can be improved by at least 6 fold by incorporating the trough rearing phase in the rearing period.--Copyright 1972, Biological Abstracts, Inc.
W73-12231

DEVELOPMENT AND OPERATION EFFICIENCY OF A CATFISH GRADER,
National Marine Fisheries Service, Rohwer, Ark.
D. C. Greenland, and R. L. Gill.
Prog Fish-Cult. Vol. 34 No. 2: p 76-80. 1972 Illus.
Identifiers: *Catfish grader, Development, Ictalurus-Punctatus, Operation, *Channel catfish, *Fish passager.

A grader to sort process-sized channel catfish (Ictalurus punctatus) was developed and tested. The unit was constructed of 8-ft-long horizontal bars having 1.75 in clear spacing. These bars were suspended 2 to 3 in. under the water surface. Fish were dumped onto one end of the grader. Smaller fish maneuvered between the bars and removed themselves from the population. Larger fish swam the length of the grader searching for an escape route and passed off the end. The addition of diverters installed at right angles to the grader bars caused larger fish to pass through the grader. Grading error was determined in vat tests and the minimum error, 15% , occurred when separating out fish 0.9 lb and larger. Fish size could be manipulated by changing bar spacing and adding the diverters.--Copyright (c) 1972, Biological Abstracts, Inc.
W73-12248

POTENTIALS OF THE REDEAR SUNFISH X GREEN SUNFISH HYBRID IN POND MANAGEMENT,
Southern Illinois Univ., Carbondale. Fisheries Research Lab.
R. C. Heidinger, and W. M. Lewis.
Prog Fish-Cult. Vol. 34, No. 2, p 107-109. 1972.
Identifiers: Hybrids (Sunfish), Lepomis-Cyanellus, Lepomis-Microlophus, Micropterus-Salmoides, Pond management, Potentials, *Sunfish (Redrear), *Sunfish (Green).

Populations of the redear sunfish (Lepomis microlophus) X green sunfish (L. cyanellus) F1 hybrid were produced both by stocking F1 fish and by stocking male redear sunfish and female green sunfish in farm ponds. The F1 fish, stocked at 1000/acre, attained weights of 0.6 and 0.7 lb by the end of their third summer. No F2 fish were observed to have survived. In ponds in which parental fish were stocked, F1 fish were produced each year. No back crosses and no F2 fish were observed to have been produced. The first yr. class of F1 fish attained a weight of 0.4 to 0.5 lb. by the end of the third summer. Largemouth bass (Micropterus salmoides) populations were produced along with the hybrid populations by stocking fingerling fish at the end of the summer following the spawn of the parental sunfish or introduction of F1 fish.--Copyright (c) 1972, Biological Abstracts, Inc.
W73-12253

CHANGE IN BODY WEIGHT CAUSED BY HANDLING AND EXERCISE IN FISH,
Hawaii Univ., Honolulu. Dept. of Zoology.
E. D. Stevens.
J Fish Res Board Can. Vol 29, No 2, p 202-203. 1972. Illus.
Identifiers: Acclimation, *Body weight (Fish), *Fish handling, *Fish exercise.

Either handling or exercise cause an increase in body weight in fish acclimated to freshwater, and a decrease in body weight in fish acclimated to sea water.--Copyright 1972, Biological Abstracts, Inc.
W73-12312

A SIMPLE ELECTRONIC SMOLT COUNTER,
Ministry of Agriculture, Fisheries and Food, London (England). Salmon and Freshwater Fisheries Lab.
D. M. Weiss.
J Fish Biol, Vol 4, No 2, p 257-260, 1972, Illus.
Identifiers: Electronic counter, Salmon, *Smolt counter, *Fish migration, Fish stocks.

The development of methods for the automatic counting of migratory fish has become a matter of some importance in the United Kingdom and elsewhere, owing to the increasing concern over the lack of accurate information about fish stocks. An instrument capable of counting fish accurately and reliably in a variety of conditions remains a goal towards which progress is being made only slowly, despite strenuous efforts by a number of organizations. The fish counters available at present are expensive to buy and sufficiently complex to be difficult to build by the majority of workers in fisheries management, there are, however, circumstances where fish may be counted by relatively simple means and an example is given. Salmon smolts swimming down a channel or tube could be reliably detected using a simple electronic circuit which was sensitive both to changes in resistance across 2 electrodes set in the water flow, and to the rate of change of resistance. These changes were amplified sufficiently to produce deflections on a recording meter so that subsequent examination of the chart gave both a count of the smolts and also the time of passage. Details of the circuit, which can be built at low cost and with only elementary equipment, are discussed briefly and some results are given.--Copyright 1972, Biological Abstracts, Inc.
W73-12332

EFFECTS OF THE FLOY ANCHOR TAG ON THE GROWTH AND SURVIVAL OF BROOK TROUT (SALVELINUS FONTINALIS),
Wisconsin Dept. of Natural Resources, Waupaca.
R. F. Carline, and O. M. Brynildson.
J Fish Res Board Can, Vol 29, No 4, p 458-460, 1972.
Identifiers: *Brook trout, Growth, Salvelinus-Fontinalis, Survival, *Tags (Floy anchor).

Two field trials were conducted to determine the effects of the gun-injected, Floy anchor tag (FD-67) on growth and survival of 10-mo.-old domesticated S. frontinalis in a 0.7 ha pond. Trials ran from Oct. to the following June. In 1968 106 tagged trout and 1005 controls, and in 1969, 300 tagged trout and 500 controls were stocked. Different fins were removed from each to determine tag loss. In both trials the trout were sampled twice through the ice and twice during open water. The tags retarded growth of the trout from Oct. to Jan.; differences in growth rates between tagged and controls were 18 and 28% for the 1968 and 1969 trials, respectively. After Jan. both groups grew at similar rates. The tags did not affect survival, and tag losses were 5.7 and 2% for the 2 trials.--Copyright 1972, Biological Abstracts, Inc.
W73-12336

09. MANPOWER, GRANTS AND FACILITIES

9C. Research Facilities

ENVIRONMENTAL RESEARCH LABORATORIES IN THE FEDERAL GOVERNMENT--AN INVENTORY, VOLUMES I AND II,
Syracuse Univ. Research Corp., N. Y. Policy Inst.
A. H. Teich, P. H. Howard, and L. Sumnicht.
Available from NTIS, Springfield, Va 22151 as PB-209 751 and PB-209 752. Price $6.00 each volume, printed copy. September 1971. 978 p, 2 append. NSF Grant GI-35.

Descriptors: *Environmental control, *Federal Government, *Administrative agencies, Research facilities, Reviews, Indexing, Laboratories, On-site laboratories, Pollution, Pollution abatement, Water pollution control.
Identifiers: *U.S. Agencies, *Environmental research laboratories, Earth resources.

This inventory presents detailed information on the whole range of existing in-house capabilities in environmental research in the Federal Government. The two-volume report contains data on about 170 Federal laboratories. The inventory is unique in the scope and depth of its coverage of Federal research activities at the field level. It is accompanied by a user's guide and a detailed index. Volume I includes Federal Government agencies alphabetically from Agricultural Research Service through U.S. Air Force. Volume II includes agencies from U.S. Army through U.S. Coast Guard. (Woodard-USGS)
W73-11845

NATIONAL ACCELERATOR LABORATORY, BATAVIA, ILLINOIS. (ENVIRONMENTAL STATEMENT).
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-11902

ENVIRONMENTAL MONITORING REPORT FOR SANDIA LABORATORIES FROM 1964 THROUGH 1972,
Sandia Labs., Albuquerque, N. Mex.
For primary bibliographic entry see Field 05A.
W73-11908

COASTAL PLAINS REGIONAL COMMISSION--ANNUAL REPORT, 1972.
For primary bibliographic entry see Field 06E.
W73-11974

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

ENVIRONMENTAL RESEARCH LABORATORIES IN THE FEDERAL GOVERNMENT--AN INVENTORY, VOLUMES I AND II,
Syracuse Univ. Research Corp., N. Y. Policy Inst.
For primary bibliographic entry see Field 09C.
W73-11845

10C. Secondary Publication And Distribution

WATER REUSE, A BIBLIOGRAPHY, VOLUME 1.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 05D.
W73-11701

WATER REUSE, A BIBLIOGRAPHY, VOLUME 2.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 05D.
W73-11702

ANNOTATED BIBLIOGRAPHY ON 14-MEV NEUTRON ACTIVATION ANALYSIS,
European Atomic Energy Community, Brussels (Belgium). Bureau Eurisotop.
For primary bibliographic entry see Field 05A.
W73-11919

ENVIRONMENTAL LAW ABSTRACTS, VOLUME II,
Oak Ridge National Lab., Tenn. Environmental Information Systems Office.
J. W. Curlin, and J. D. Jones.
Report ORNL-EIS-72-9, November 1972. 195 p. NSF-AAA-R-4-79.

Descriptors: *Water law, *Abstracts, *Documentation, *Bibliographies, Publications, Water pollution control, Environmental protection, Water resources, Planning.

This user-oriented research project of the Oak Ridge National Laboratory produced in collaboration with the University of Tennessee College of Law, is an attempt to bridge the communication gap between scientists and lawyers. The bibliography is useful to those in the legal profession who are concerned with environmental problems. Bibliographic citations, abstracts, and key words describing the literature are in a format which is designed for computer retrieval by key words. Comprehensive and extensive treatment is given to air pollution, drainage, environmental control, forests, marine resources, natural resources, pollution, public lands, regional planning, science, zoning, territorial waters, and watercourses. In addition, agriculture, city planning, easements, eminent domain, mines, the nuclear industry, oil and gas, real property, space law, state agreements, and treaties are scanned for pertinent environmental titles. The thesaurus is organized under descriptor subdivisions and for maximum flexibility and economy of retrieval, some key words have compound entries. An author index is also included. (Mockler-Florida)
W73-11998

WATER PUBLICATIONS OF STATE AGENCIES. A BIBLIOGRAPHY OF PUBLICATION ON WATER RESOURCES AND THEIR MANAGEMENT PUBLISHED BY THE STATES OF THE USA.
Water Information Center: Port Washington, N.Y. 1972. 319 p, Illus. Pr $39.50. G. J. Giefer, and D. K. Tood, editors.
Identifiers: *Bibliographies, Books, Management, Publications, *State agencies, Water resources.

The publication information given here is largely that supplied by the agencies themselves. The bibliographic format employed by each agency has been retained, and an address is given for every state agency listed. Brief introductory statements with information as to availability and price of publications have been included where they were supplied. The water resources research centers established in each state under Public Law 88-376 have been included. Agricultural experiment stations, agricultural extension service agencies, and interstate agencies are omitted. In those cases where the orientation of an agency includes water as only one element in a broader spectrum, only those titles from their publications were included which were directly related to water resources. In the case of State Department of Fisheries, titles are listed which reflect a close association between the fishery resource and the water resource; the same criterion was applied in regard to wildlife.–Copyright 1973, Biological Abstracts, Inc.
W73-12161

RHODE ISLAND MARINE BIBLIOGRAPHY.
Rhode Island Univ., Kingston. Coastal Resources Center.
For primary bibliographic entry see Field 02L.
W73-12316

DISSOLVED ORGANIC MATTER IN NATURAL WATERS: A SELECTED BIBLIOGRAPHY, WITH EMPHASIS ON ANALYTICAL METHODS,
State Univ. Coll., Plattsburgh, N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 02H.
W73-12329

10F. Preparation of Reviews

ISOTOPE METHODS IN GROUNDWATER SCIENCE (ISOTOPENMETHODEN IN DER GRUNDWASSERKUNDE),
European Atomic Energy Community, Brussels (Belgium). Bureau Eurisotop.
For primary bibliographic entry see Field 02F.
W73-11929

SOME REMARKS ON MERCURY AS AN AQUATIC POLLUTANT AND ITS IMPLICATIONS,
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For primary bibliographic entry see Field 05C.
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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

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